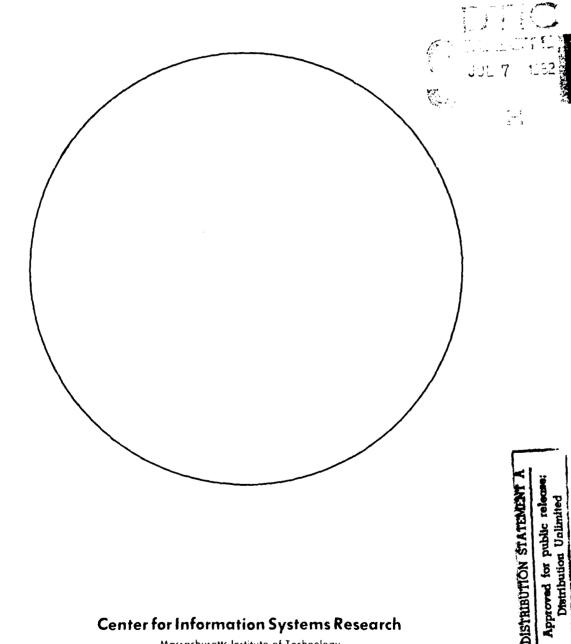
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Center for Information Systems Research

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FSTV:
THE SOFTWARE TEST VEHICLE
FOR THE
FUNCTIONAL HIERARCHY OF THE
INFOPLEX DATABASE
COMPUTER

Technical Report # 9

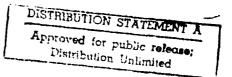
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Meichun Hsu

January, 1982

Principle Investigator:
Professor Stuart E. Madnick

Prepared for: Naval Electronics Systems Command Washington, D.C.

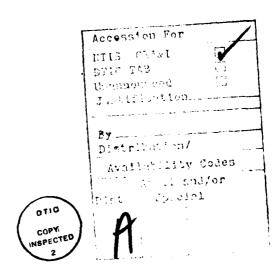


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Implementation of FSTV is based on a preliminary design of the Functional Hierarchy presented in Hsu80. In that design, data base management functions are decomposed into hierarchical levels, each level to be implemented as a level of the Functional Hierarchy. The current version of FSTV is implemented with special attention paid to a richer set of data base capabilities and architectural compatibility.



## **ABSTRACT**

This report describes in detail the current implementation of the software test vehicle (STV) for Functional Hierarchy of INFOPLEX data base computer.

The purpose of STV is to provide a better understanding of the architecture and funcitonalities of the INFOPLEX design by emulating its architecture and simulating its functionalities in software. It aims at validating the communication protocols among its various components, tightening functional algorithms for database management and data movements, providing behavioral and preliminary performance information concerning the architecture, and serving as a test bed before realizing the design in the hardware prototype.

Implementation of FSTV is based on a preliminary design of Functional Hierarchy presented in <Hsu80>. In that design, data base management functions are decomposed into hierarchical levels, each level to be implemented as a level of Functional Hierarchy. The current version of FSTV is implemented with special attention paid to a richer set of data base capabilities and architectural compatibility.

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# 1.0 OVERVIEW OF THE REPORT

This report describes in detail the current implementation of the software test vehicle (STV) for Functional Hierarchy of INFOPLEX data base computer. The basic concepts of INFOPLEX are found in <Madnick 78> and the reader is assumed to have some understanding of the proposed architecture of this data base computer.

The purpose of STV is to provide a better understanding of the architecture and funcitonalities of the INFOPLEX design by emulating its architecture and simulating its functionalities in software. It aims at validating the communication protocols among its various components, tightening functional algorithms for database management and data movements, providing behavioral and preliminary performance information concerning the architecture, and serving as a test bed before realizing the design in the hardware prototype.

The STV project is divided into the Functional Hierarchy STV (FSTV) and the Storage Hierarchy STV (SSTV). In addition, there is a Control Structure Program which provides an emulation of the multi-level multi-processing hardware architecture and

communication protocols. FSTV and SSTV are to be developed separately, each integrated with a separate copy of the Control Structure Program. However, the eventual goal is to produce an integrated version, in which FSTV and SSTV are coupled together through a single copy of the Control Structure Program.

Implementation of FSTV is based on a preliminary design of Functional Hierarchy presented in <Hsu80>. In that design, data management functions are decomposed into hierarchical levels, each level to be implemented as a level of Functional A 3-level version of FSTV was implemented by Bruce Hierarchy. Blumberg <Blumberg81>. His implementation followed philosophy of hierarchical decomposition and incorporated many However, his version did not take the distictive features. hardware architecture of Functional Hierarchy into account, and could not be integrated with the Control Structure. Based on his availability of a Control Structure experience and the implemented by Tak To <To81>, the current version of FSTV is implemented with special attention paid to a richer set of data base capabilities and architectural compatibility.

This report is divided into 6 chapters. The next chapter provides an overview of the functionalities of FSTV as a data base management system: what it does, what data model it implements, and how it interacts with the user. Chapter three provides a description of the implementation characteristics of FSTV. In particular, it contains conventions used to preserve

architectural compatibility and to interface with the Control Structure. Chapter four and five are primarily program documentation. A description of a set of service routines devised to ease the task of interfacing with the Control Structre is presented in Chapter four, while Chapter five contains an explanation of functional program modules in the current implementation. Chapter six concludes this report by pointing out directions for future refinement. A sample terminal session is included in Appendix 1. Appendix 2 contains a list of Control Blocks (used as inter-level interface) and external/static variables. Finally, a complete program listing is found in Appendix 3.

## 2.0 OVERVIEW OF DATA BASE SYSTEM CAPABILITIES OF FSTV

FSTV currently implements a subset of functionalities proposed in the preliminary design <Hsu80>. The proposed architecture with respect to data abstraction is similar to that of the ANSI/SPARC design, basically a 3-level architecture which contains an external schema level, a conceptual schema level and an internal schema level. In our design, however, we have added a base data model schema level to capture data definition of the integrated data base and to support multiple conceptual schemas defined on top of, and mapped to, the base data model schema. This way, a conceptual schema may use a data model which is different from that of the base schema, effecting support of a multiple data model data base management system. External schemas can then be defined on top of, and mapped to, a conceptual schema. This 4-level architecture is depicted in the following figure.

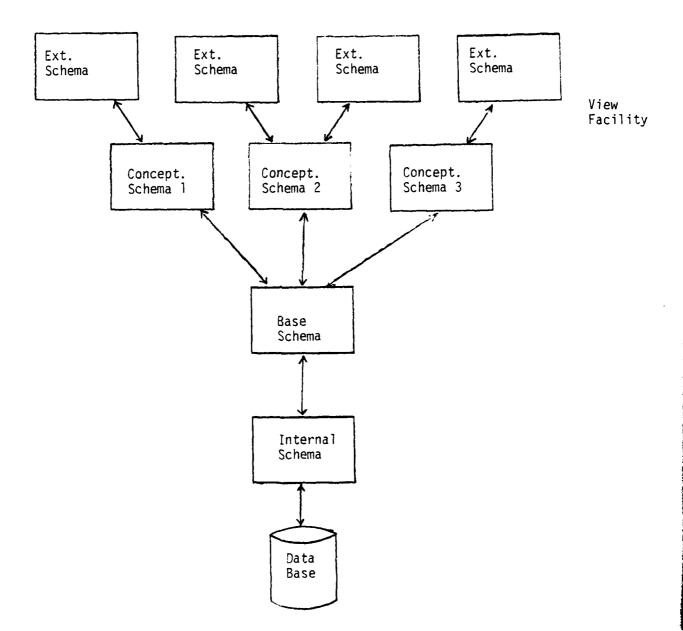


Figure: Architecture of INFOPLEX with respect to data abstraction

The upper two levels in the figure are aggregatedly called the veiw facility. In the current version, the view facility is not available, and the base data model implemented at the base schema level is an entity network data model. Therefore, this level is called the Base Schema Level or the Entity Level in FSTV.

This overview chapter describes what the system can do and how a user may interact with the system. It also provides a brief description of the entity network data model and the internal schema used in FSTV. A sample terminal session is included in the Appendix.

# 2.1 STRUCTURE OF USER SESSION

FSTV interacts with a user through a user session in the User Interface Level. Since currently only the DBA session is available, the user will enter the DBA session, in which he may define or manipulate the database. If the former is chosen, a data definition session is initiated. If the user chooses data manipulation, then he may create, delete, modify and query the database. The User Interface Level guides the user into the desired seeion and then accepts input strings, parses them and formulates proper requests to go down to the next level. It also displays error messages or return data at the user's terminal

based on the return from the next level. The structure of the user interface is depicted in the following figure.

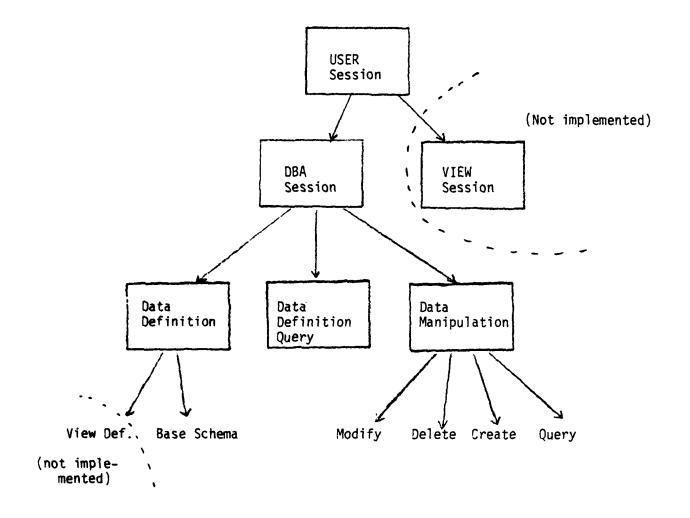


Figure: Structure of the User Sessions

# 2.2 DATA DEFINITION SESSION

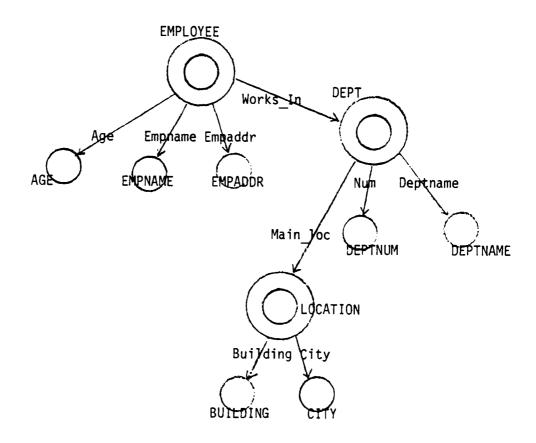
The DBA defines the data base in an entity network data model. This model views the world as a collection of entities and attributes of these entities. Generically similar entities are grouped into entity sets. Entities in one entity set will share the same set of attributes.

The DBA will model the application environment into entity sets. For each entity set, he may define an arbitrary number of attributes. The domain of an attribute can be either a value set or an entity set. It is through the latter that the entity sets defined can be made to explicitly relate to each other and form a network.

This entity network data model bears many properties that recent research in the area of data modelling has advocated. Its basic principles are outlined in Hsu80> and a draft of a detailed description of this model, including its retrieval and update primitives, is forthcoming. However, the current implementation extracts only a subset of its intended set of semantics. In particular, concepts such as generalization and inter-entity-set aggregation are not provided. A virtual information facility is also lacking. Nevertheless, the basic structure of the data model is preserved such that additional

semantics may be added to without a complete rewrite of the current implementation.

Before we describe the data definition session in detail, we remind the reader of a few definitions used in the entity network data model. An attribute with a value set as its domain is called a value attribute; on the other hand, if its domain is an entity set, the attribute is called an entity attribute. Also, a direct attribute is an attribute which is directly related to the entity set. In contrast, a derived attribute is an attribute of an attribute. For example, in the following figure which describes an entity network data base schema, EMPNAME is a direct attribute of the entity set EMPLOYEE, while DEPTNUM is a derived attribute of EMPLOYEE because it is a direct attribute of the entity set DEPT, which in turn is the domain of the WORKS\_IN attribute of EMPLOYEE.



: Entity Set

: Value Set

· Attribute

Figure: An Example of the Entity Network Schema

The Base Scehma Level, as currently implemented, will accept definitions of entity sets and their attributes. To define the base schema, the DBA enters the Base Schema Data Definitionn Session. An entity set is to be defined by giving an entity set name. An attribute definition, on the other hand, includes the name of the attribute, its domain type (i.e., value set or entity set), and its funciton type (i.e., many-to-one, one-to-one, or key). If the attribute is a value attribute, the definition also specifies the value type (i.e., numeric or character) and maximum length of the value (in number of characters), and if the value type is numeric, the allowable numeric range. If it is an entity attribute, only the name of the domain entity set need be given.

To facilitate ease of use, the user is provided with a panel to describe the data definition. Appropriate prompts are given in the panel.

Data definition can be incremental; i.e., new entity sets and additional attributes for existing entity sets may be defined after some data has been inserted into existing entity sets.

# 2.3 DATA DEFINITION QUERY SESSION

A user may choose to enter this session to discover what entity sets and attributes have been defined for the database. He may choose to look at the definition of all entity sets or that of a particular entity set. He may also choose to look at the definition of all attributes of an entity set or that of a particular attribute. The system will provide appropriate prompts as the user proceeds.

# 2.4 DATA MANIPULATION SESSION

In an entity network data base, entities may be created and deleted. Attribute values can be inserted, modified or deleted. A non-procedural query language can be used to retrieve information from the database. To do these, the user will get into the data manipulation session.

## 2.4.1 DATABSASE QUERY

To do a query, the user enters the Query Subsession. He will give the name of the entity set and a list of attribute names of this entity set he would like to see. If any of the attributes

has a predicate (e.g., >150, ='Stu Madnick'), the user will give it along with the attribute list. Multiple predicates are allowed on an 'AND' basis. (No 'OR' capability is provided for in the current version.)

The attribute list may also include derived attributes. The user expresses the derived attribute as a series of direct attributes that would lead to that derived attribute. For example, the city of the main location of the department an employee works in, using the example database shown in the above figure, is expressed by

WORKS\_IN (MAIN\_LOC (CITY))

as a derived attribute of the employee entity. The derivation path can be arbitrarily deep. An example query statement is given below:

**EMPLOYEE** 

EMPNAME, EMPADDR, AGE > 50, WORKS IN (DEPTNUM = 15)

This query wants the employee name, address, age and the department number of the department the employee works in, for those employees whose ages are greater than 50 and who work in department number 15.

## 2.4.2 CREATING ENTITIES

To create entities, the user enters the Create Subsession. The user will give the name of the entity set he is to create entities for, and a list of attributes that he will give values to. He then will provide the values of these attributes at the prompt for data. The attribute list may include derived attributes, in which case the value given for that attribute is used to identify an existing entity that the new entity is to associate with. For example, in creating an employee, one of the attributes may be WORKS\_IN (DEPTNUM), and the corresponding attribute value given by the user is used to identify the department the user works in. However, the new entity cannot be made to relate to a non-existing entity. In our example, if the department number given does not identify an existing department entity, the employee cannot be created.

To create an entity, the user can select the set of attribtes of which values will be given. That is, an entity may be created while values of some attributes of the entity are not known.

The system will also intercept values of attributes that violate the attribute definition. This includes key violation, value type violation and numeric range violation.

#### 2.4.3 MODIFYING ENTITIES

Values of attributes of existing entities (i.e., entities already created using the CREATE command introduced in the previous subsection) may be modified. To do so, the user must enter the Modification Subsession. Modification of attributes takes 3 forms: insert, modify and delete. However, the user must first identify the entity to be modified by giving value(s) of its attribute(s) that will uniquely identify the entity in the entity set. Then he will specify the attributes to be modified, prefixing them with a modification operator (i.e., insert, modify or delete). At the prompt for data, the user will enter new values of these attributes. The following is an example of a modify command:

## **EMPLOYEE**

-ID:EMPNUM, -INSERT:WORKS\_IN(DEPTNUM), -MODIFY:EMPADDR

105, 14, '550 Memorial Drive'

where EMPLOYEE in the first line specifies the entity set name, and the second line provides the information about what to be modified: the employee entity to be modified is identified by employee number 105, the attribute of this employee to be inserted is a derived attribte which asserts that this employee now works in department 14, and this employee's address is to be changed to '550 Memorial Drive'.

Notice that the interpretation of a derived attribute appearing in the modify command is the same as that in the create command; that is, it merely associates the entity being modified to an existing entity, but does not create any new entities or values. An error message will be given if the associated entity cannot be found in the existing data base. Also, violation of attribute definition will cause the modify command to be rejected.

## 2.4.4 DELETING ENTITIES

To delete an entity, the user enters into the Delete Subsession. All that the user has to specify is a set of attributes that will uniquely identify the entity to be deleted. All other attributes of this entity will automatically be removed. An example is given below:

**EMPLOYEE** 

**EMPNUM** 

105

This command deletes the employee entity whose number is 105.

# 2.5 DATA BASE INTERNAL SCHEMA

The data base internal schema describes how data in the data base is actually stored. It includes aspects such as access paths and record formats. This section provides a brief description of the internal schema used in the current version of FSTV, which is implemented at the Internal Schema Level and the Memory Management Level.

The internal schema used in FSTV is a simple network type of link list. Data elements are grouped into Primitive Sets (Psets). For each primitive set, an arbitray number of Binary Associations (Bsets) can be defined. When a data element is to be stored, the level of FSTV above the Internal Schema Level identifies the Pset this data element belongs to, and passes this to the Internal Schema level to be stored in that Pset. Likewise, the data elements a data element associates with through certain Bsets can also be given, and later can be retrieved together with that data element. In order to do so, the upper level will have to define Psets and Bsets for the Internal Schema Level, and remember the meaning of each Pset and Bset. The Internal Schema Level will provide IDs for Psets and Bsets defined. This concept of BEU is depicted in the following figure.

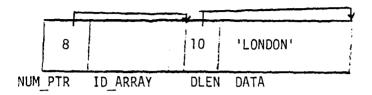


Figure: An example BEU

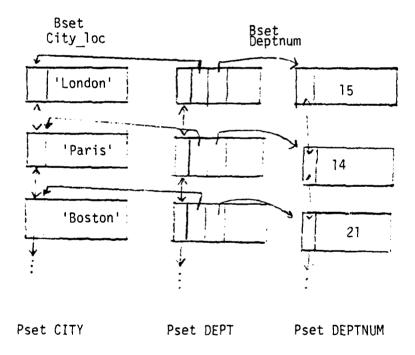


Figure: An example BEU network

The way the internal schema level organizes these data elements is through linkage. Each data element is implemented as a Basic Encoding Unit (BEU). A BEU contains the data and some control information. In the current version, a BEU contains an ID array, the size of which is indicated by the NUM\_PTR field of a BEU, and a data field, the size of which is indicated by the DLEN field of a BEU. BEUs of one Pset are chained together through a bi-directional link list, making use of two slots in the ID array. Association with other data elements is implemented by storing the IDs of the latter in pre-allocated slots in the ID array. By 'pre-allocated' we mean that the position of the slot determines the meaning of the association, or the Bset id. Through this simple mechanism, data elements and their associations are remembered by the data base.

In the current version, there are no special access paths built for the purpose of improving performance of a search, such as indices and hash tables. There is also no intelligent access path selection algorithm to identify the most efficient way of locating a data element given its direct or derived associations. While these capabilities occupy the highest priority in future refinement, the basic functionalities of creating, deleting, modifying and retrieving data elements are all present.

The Memory Management Level responds to the Internal Schema Level's requests to store and retrieve BEU's. When a BEU is stored, the Memory Management Level provides an id which can be

used as a key for retrieval of the BEU. This level currently manages the virtual storage by linearly assigning BEU's to be stored in the next available address. No segmentation or clustering is provided for.

# 3.0 IMPLEMENTATION CHARACTERISTICS OF FSTV

In Chapter 2, discussion centered around the capabilities of the FSTV from the point of view of a DBA or a database user. In this chapter we shall describe implementation considerations which characterize FSTV as a Software Test Vehicle for the Functional Hierarchy of INFOPLEX. The content of this chapter can also be viewed as a set of strategies and programming conventions used in the STV project, and guidelines to be followed in future software modifications and additions. The following two subsections describe implementation characteristics relating to the emulation and functional decomposition aspects, respectively, of FSTV.

## 3.1 EMULATION OF A MULTI-LEVEL MULTI-PROCESSOR ARCHITECTURE

As mentioned earlier in Chapter 1, one of the purposes of the STV is to validate proposed algorithms in an emulated multi-level multi-processor architecture and to observe their behavior. The Control Structure Subsystem of the FSTV is devised to provide

this emulated environment. While the modules in the FSTV do not have to be aware of details of the (emulated) hardware environment, its program structure and communications between modules must conform to those demanded by the Control Structure. The Control Structure, on the other hand, will provide mechanisms for multi-processing and global bus and gateway controller emulation during execution of the FSTV modules.

Two types of programming conventions are observed during implementation of FSTV in order to facilitate working with the Control Structure. They are described in the following subsections.

## 3.1.1 SCOPE AND STORAGE CLASS OF VARIABLES

The context switching mechanism used in the Control Structure requires that the static and the controlled variables be used with caution. (Refer to chapter 7 of <To81>.) In essence, the FSTV program modules should make use of the based and automatic variables and refrain from using the static and controlled variables as much as possible. In the current implementation of the FSTV, static variables are used in association with the initialization modules only; i.e., once the FSTV is initialized, values of these variables will stay constant during run time.

The controlled variables are not used in any module. By observing this rule, the FSTV modules are made re-entrant, therby making it a relatively simple task to generate the multi-threaded version of the FSTV.

In addition, the architectural requirement that there be no shared data across levels necessarily limits the scope of the variables to being within the modules of the same level only. External variables known to modules across levels should not be used. A simple rule to follow therefore is to avoid using external variables. In the current implementation, use of the external variables are associated with the initialization variables mentioned in the previous paragraph, and none are known across levels. Appendix 2 contains a list of all external and/or static variables used in the current version.

## 3.1.2 INTER-LEVEL COMMUNICATION

The hierarchical structure of INFOPLEX requires that inter-level procedure calls go through gateway controllers and the global bus. In simulating this architecture, the Control Structure Subsystem of the STV assumes that the functional modules observe the inter-level procedure call convention.

Inter-level communications in the FSTV are in the form of message passing between adjacent levels. Direct communication between unadjacent levels is not used.

Message passing vs. subroutine call. Each level of INFOPLEX contains a number of functional modules. In the STV, they are represented by program modules. Normally, when a module encounters a sub-task which is to be processed by another module, it uses a subroutine to activate the latter. However, since the FSTV is constructed for use in a multi-level multi-processor system, a number of pre-defined tasks are not invoked directly, but are invoked through message passing, a facility which is provided by the Control Structure. In fact, all cross-level invocations are done through message passing. This conforms to the requirement of the architecture as well as to the need of informing the Control Structure in the event of an inter-level call, so that the Control Structure can emulate the load on the gateway controller and the global bus.

The Control Structure provides a set of message passing protocols (including message passing among modules in the same level.) (Refer to chapter 5 and 7 of <To81>.) When a module at a higher level in the Functional Hierarchy needs to invoke a module at a lower level, it necessarily makes use of these protocols in place of a direct subroutine call. Likewise, when the module at the lower level completes the task, it makes use of these protocols to send the results back to the invoking module.

To this end, all modules in the FSTV are divided into two groups: the Top-Level Procedures (T-proc's) and the Subroutine Procedures (S-proc's). The T-proc's are always invoked by message passing, and the S-proc's by direct subroutine calls. Each level is consisted of a set of T-proc's which can be invoked by the upper level, and a set of S-proc's whose names are unknown to any other levels, and are not directly invocable by the upper level. It is noted that to invoke a T-proc at the same level a process will have to send a message to it rather than to use a traditional subroutine call. Therefore the convention for inter-level procedure call is more properly termed as the convention for inter-T-proc call.

Since T-proc's represent entry points to a level, special attention is given to its invocation. The arguments needed to invoke a T-proc are grouped into a set of Control Blocks. A control block is a based variable which cntains a pre-defined data structure. The set of control blocks associated with a T-proc includes both the calling control blocks and the return control blocks. When the T-proc is invoked, it is passed a link list of calling control blocks; when it returns, it puts the return messages and values in a link list of return control The names of the T-proc's at a level and the control blocks. blocks associated with them collectively form the interface of the level seen by the upper level. This mechanism satisfies the requirement that "..each level of the functional hierarchy interacts with other levels through a clean set of interfaces"

<Hsu80>. Messages passed between levels are, therefore, link lists of control blocks. Details of control block formatting conventions are described in the following.

Control Block Format. According to the hardware architecture of INFOPLEX which requires that no shared memory is used between levels, when a message is to be passed to a process at another level the message is to be physically moved from the local memory of the calling level to that of the called level. In simulating this activity, the Control Structure has to be given a pointer to the message and the length of the message. While it is possible to give the Control Structure a message in a contiguous block, it is more desirable from the programmers' point of view to be able to give the Control Structure a link list and the necessary information for the Control Structure to collect all data in the link list. To this purpose, a convention for interacting with the Control Structure is devised: every element (a Control Block) of the link list contains a CNTL\_INFO as the first field of the data structure as follows:

- 2 CNTL INFO,
  - 3 LEN FIXED BIN (15),
  - 3 CBTP FIXED BIN (15),
  - 3 PTR PTR.
- 2 DATA.

. . . .

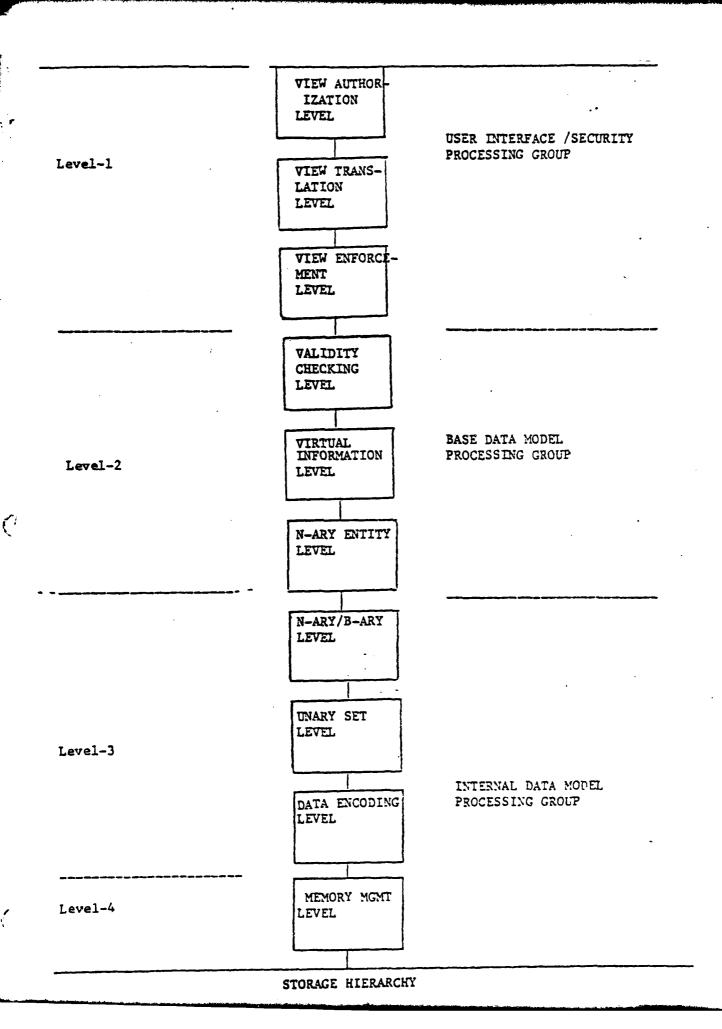
where LEN describes the length of the data portion of the control block, CBTP is a unique number assigned to this type of control block, and PTR points to the next control block in the link list. With the information in CNTL\_INFO the Control Structure will be able to collect all elements and move them to the other level. Similary, the called process simply follows the pointers to obtain all arguments it needs. The data structure of the DATA portion of a control block list represents the agreed upon interface between sending and receiving processes. This convention aplies to both argument passing and return data. Examples of Control Blocks are given in Appendix 2.

Service routines and programming conventions. In order to insulate the FSTV modules from furture changes to the Control Structure-provided communication protocols, a set of service routines are used to centralize the use of these protocols. These are SVCS1 and SVCS2. In adiition, since the current version of FSTV does not make use of intra-request parallelism, another set of service routines are devised on top of SVCS1 and SVCS2 in such a way that, if these routines are used to invoke protocols provided by the Control Structure, the existence of the Control Structure could be completely shielded from the FSTV. Therefore, for example, it is possible to run FSTV alone without the Control Structure, so long as the second set of service routines is replaced by a dummy set. This feature enables independent debugging and testing of the FSTV from the Control Structure, thereby reducing the complexity of the software

development process. The next chapter contains a description of these service routines, their interfaces and how to use them.

## 3.2 FUNCTIONAL DECOMPOSITION

The database management functions in the current version of the FSTV have been hierarchically decomposed into four levels. Each level communicates with only the adjacent level. The following figure illustrates the relationship between the current implementation and the target implementation as outlined in <Hsu80>. While the current implementation is a simplified version of the target system, it illustrates the process of reducing a reasonably complicated user query to accesses/updates in a linear address space.



One important 'feature' of the design is to be stressed. To eliminate duplication of data storage and its management functions, system databases (e.g., catalogues) used at a level are stored and manipulated as regular data at the next level. That is, all the catalogues used at a level are defined as data sets at the next lower level during the initialization process. This means that the local memory at a level is strictly used for storing the context of active processes, and that all the structuring information such as catalogues and indices as well as the database itself is stored in the virtual memory (therefore in the Storage Hierarchy) managed by the Memory Management Level.

The four levels in the current implementation are briefly described as follows. Details of the functional modules are the subject of chapter 5.

1. User Interface Level (Level 1): This level interacts with the user directly. It accepts users' commands to define and manipulate the databases. It parses input character strings, identifies the meaning of the input tokens, and generate proper requests to the next level for validation and execution of the input commands. For ease of use, the data definition portion of the user interface makes use of the panel facility, which enables the DBA to define the database by filling up blanks in a pre-defined panel. This level does not create or make use of any system databases.

- 2. Database Semantics Level (Level 2, or The Entity Level):
  This level manages the entity/attribute catalogues,
  validates database insertions and updates, and transforms
  the high level database definition and manipulation requests
  into commands to operate on the data structures of the
  internal schema. The system database at this level, the
  entity/attribute catalogues, is itself defined in terms of
  entities and attributes, and is stored as regurlar database
  data in the next level.
- 3. Internal Schema Level (Level 3, or The N-ary Level): This level manages the Pset/Bset catalogues and performs retrieval and update of the content of the pre-defined Psets and Bsets. It accepts a tree-structured database command and decides upon the P-elements to be retrieved or affected the command. It ultimately implements and executes information in the database in the form of BEU's (Basic Encoding Units); a BEU is given to the next lower level to be stored as a unit of bit string. The internal schema implemented in the current version is very simple: it implements P-elements within the same Pset as an unsorted bi-directional link list, and binary associations among the P-elements through uni-directional linkage pointers.
- 4. Memory Management Level (Level 4): This level manages a linear virtual address space which is initialized by the FSTV Console Program as a based area of a certain size.

Store, retrieval and update of BEU's are carried out at this level as operations on this based area.

### 4.0 FSTV INTER-LEVEL COMMUNICATION SERVICE ROUTINES

This chapter documents the set of service routines used by FSTV functional programs to interface with, and to insulate from, the Control Structure-provided message passing protocols. The first section describes the two service routines, SVCS1 and SVCS2, which are used by FSTV functional modules to insulate themselves from directly using the SEND protocol provided by the Controld Structure. The second section describes another set of service routines, TCALL, TBEG and TRTN, which are used to insulate the FSTV completely from the Control Structure.

# 4.1 INSULATING FROM SEND PROTOCAL -- USE OF SVCS1 AND SVCS2

Convention for the calling procedure. When a process wishes to invoke a T-proc, it must send a message to the operating system of the target level. The message will contain the name of the procedure to be invoked and a pointer to a message to the invoked procedure. The latter message contains the return address (e.g., the mail box number) and calling arguments if any.

The calling process will prepare the calling arguments as a link list of control blocks. (The meaning and the format of a control block has been described in the previous chapter.) This link list is called a <u>calling control block link list</u>. The calling control block link list will then be prefixed with a special control block, the MSG control block. The purpose of this MSG control block is to inform the invoked procedure of the process id (i.e., the process address) of the calling process, so that return messages shall be routed correctly. The format of this MSG control block is exemplified by the following declaration:

```
DCL 1 MSG BASED (P),

2 CNTL_INFO,

3 LEN FIXED BIN (15) INIT(6),

/* LENGTH OF DATA PORTION */

3 DUM_CBTP FIXED BIN, /* NOT USED */

3 PTR PTR,

/* POINT TO FIRST CONTRO BLOCK IN CALLING

ARGUMENT LINK LIST */

2 DATA,

3 PROC_ADDR,

/* ADDRESS OF THE PROCESS INITIATING

THIS MESSAGE */

(4 LEVEL,

4 VPID,

4 BOXID) FIXED BIN (15);
```

The entire message link list is sent by calling SVCS1 service routine. SVCS1 takes 2 arguments: the name of the procedure to be invoked (CHAR(8)) and a pointer to the message link list (PTR). It does not care about the content of the message link list. SVCS1 returns a return code (FIXED BIN(15)):

CALL SVCS1 (PROC\_NAME, PTR, RTN\_CODE);

After the call, the calling process may continue until the point at which a return message from the call is needed. It then calls the WAIT protocol provided by the Control Structure, specifying the mailbox it waits on:

CALL WAIT (BOXID);

after which it may obtain the return message by moving the relevant data pointed to by VP.WAIT.MSG (set by the Control Structure) to the appropriate variables.

A calling process may send multiple messages at the same time, thereby achieving the benefit of intra-request parallelism.

Convention for the called procedure. All T-proc processes will have to respond to the message passing protocols set up by the Control Structure. When it is created, it must first locate the message link list passed to it from the caller in the base variable pointed to by VP.WAIT.MSG. Before it finishes, it must

have sent the return message, if any, to the calling process. The format of the message passed to it is as described in the previous subsection. To send a return message to an existing process, however, SVCS2 is used. SVCS2 also takes 2 arguments: the address of the receiving process (LEVEL, VPID, BOXID) and a pointer to the return message link list: (The return message link list is constructed in a way similar to that of the calling message; i.e., a return control block link list prefixed with a MSG control block.)

CALL SVCS2 (PROC\_ADDR,P,RTN\_CODE);

Note that it is possible for 2 processes to engage in a conversation, in the sense that the calling process may send a second message to the called process after the calling process has already obtained some return message from it. That is to say, a called process needs not "finish" itself immediately after sending the return message.

Summary. The functional program modules accomplish inter-T-procedure calls through SVCS1 and SVCS2 service routines. SVCS1 is used to invoke a new process, while SVCS2 is used to send (return) messages to a known process. Both SVCS1 and SVCS2 take two arguments: the name of the procedure to be invoked or the address of the existing process the message should go to, and a pointer to the message link list.

Text inclusion. A module which wishes to use SVCS1 and SVCS2 should include the macro SVCS. Declarations of MSG, PROC\_ADDR, PROC\_NAME are provided for in the macro.

# 4.2 INSULATING FROM CONTROL STRUCTURE -- ADDITIONAL SERVICE ROUTINES

To avoid direct use of WAIT and FINISH protocols and VP.WAIT.MSG provided by the Control Structure as well as SVCS1 and SVCS2, a functional module may use a set of 3 service routines to accomplish inter-T-proc communication: TBEG, TRTN and TCALL.

Convention for the called T-proc. When a T-proc process is first invoked, it calls TBEG to obtain the return address (i.e., the process address of the calling process.) The call takes the following form:

CALL TBEG. (PROC ADDR, P);

where PROC\_ADDR will be loaded with the identifier of the calling process, and P points to the first control block in the argument link list.

Note that the MSG control block described in the previous section is stripped off by TBEG and no longer concerns the functional module. When a T-proc returns, it calls TRTN to pass the return control block link list to the calling process. The call takes the following form:

CALL TRTN (PROC\_ADDR,P);

where PROC\_ADDR is as described above and P points to the first control block in the return control block link list. Note also that the user of TRTN no longer needs to prefix its return link list with the MSG control block, since the latter will be added to by the TRTN routine.

Convention for the calling T-proc. When a module wishes to invoke T-proc, it formats the arguments in the form of a control block link list, and then issues the following call:

CALL TCALL (PROC\_NAME, BOXID, ARG PTR, RTN\_PTR);

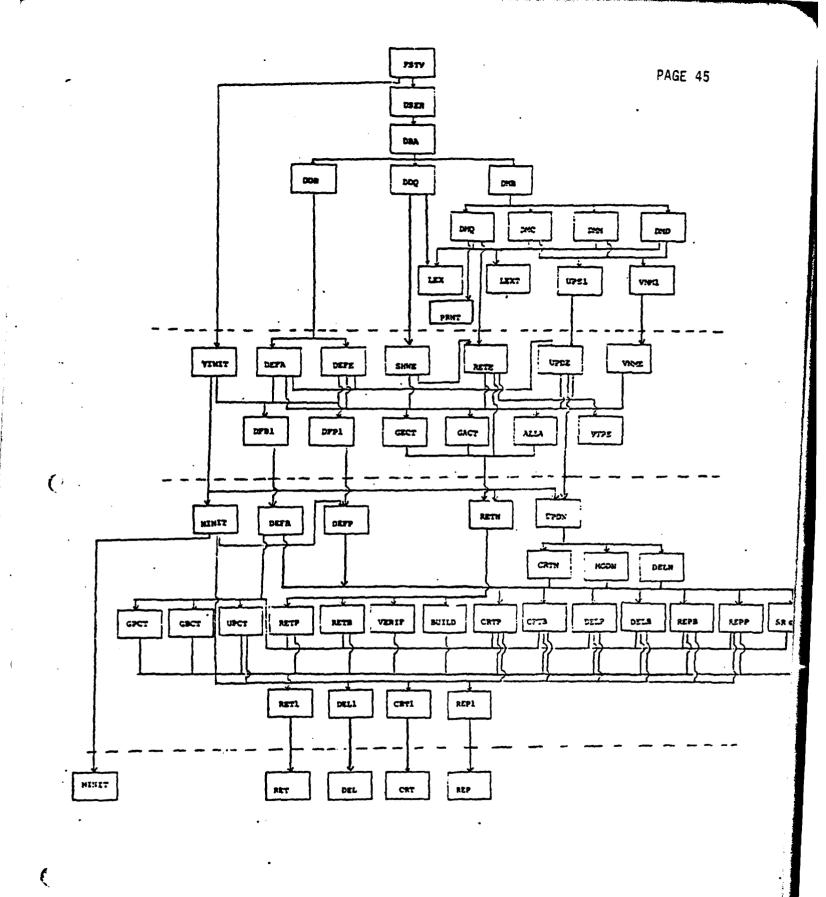
where PROC\_NAME is the name of the T-proc to be invoked, BOXID is the mailbox number where the caller wishes the return messages to be stored, ARG\_PTR points to the first control block in the argument control link list, and RTN\_PTR (a return value) will point to the first control block of the return control block link list.

# NOTES:

- 1. This set of service routines can not be used to engage two communicating processes in a "conversation mode" (refer to section 2), nor can it be used when there is intra-request parallelism involved.
- 2. To use this set of routines, the SERVICE macro must be included.

## 5.0 OVERVIEW OF FSTV FUNCTIONAL PROGRAM MODULES

This chapter contains a description of the logical function and the data structure of program modules in the current version The description follows the four hierarchical levels employed in FSTV, starting from the bottom level. For each level, we will discuss the data model (i.e. the data structure of objects processed at the level) and the system databases used, and provide an overview of the data definition, data manipulation, and level initialization modules that make up the level. The reader will notice that modules at a level are classified into T-proc's and S-proc's as discussed in the previous chapters, and that conventions and constraints mentioned previously are observed. In addition, the reader will see how information abstraction proceeds from the bottom level which recognizes only a linear virtual address space used as the database store to the database semantics level which processes high level constructs such as entities and attributes. complete listing of these program modules is included in Appendix The following figure contains a diagram showing all modules in the current implementation.



# System Initialization.

Functional Hierarchy initialization consists of activities which render the functional modules in a runnable condition. Presently an assumption is made of the initial condition of the system when it is 'powered on': each level will already have all the functional modules loaded into its local memory. This may not be the case in reality. A bootstrap procedure which loads the minimum set of the functional modules (the core set) from the Storage Hierarchy may have to be added to each level. However, for the purpose of this first version, we may assume that this type of bootstrap is taken care of by the local operating system, which is simulated as part of the Control Structure and is out of the scope of FSTV.

Initialization of catalogues is also necessary before the system can respond to normal processing. For a system without an existing database (i.e., an INFOPLEX just bought off the shelf), the initialization module at a level will define the catalogue structures used at the level in terms of data sets implemented at the next lower level and establish a set of 'key' values which will be used at this level when normal processing starts. This means that initialization ought to start from the bottom level. To initialize a system which already has a database, the catalogue definition activities are omitted, and the initialization module simply restores the key values. The

individual initialization modules will be discussed further in the following subsections.

# 5.1 MEMORY MANAGEMENT LEVEL

The function of this level is to manage the virtual memory address space that Functional Hierarchy is provided for by Storage Hierarchy and to interface with Storage Hierarchy.

#### 5.1.1 DATA MODEL AT THE MEMORY MANAGEMENT LEVEL

The basic element stored in SH is the Storage Encoding Unit (SEU). Each stored SEU is assigned a SEU id, which is equivalent to the virtual address of this stored SEU in the Storage Hierarchy. An SEU has the following format:

### DCL 1 SEU BASED (SEUPTR)

- /\* 2 MOVE\_PTR BIT(32), NOT USED CURRENTLY \*/
  - 2 N FIXED BIN,
  - 2 INVAL CHAR(1) INIT('N'),
  - 2 DATA CHAR(I REFER (SEU.N));

where MOVE\_PTR is an id in the SH which is always null unless the SEU has been moved, in which case MOVE\_PTR contains the new location in SH, INVAL is a flag which, when set, signifies that this SEU has been deleted, and finally DATA is a character string with a variable length indicated by N and contains the data of this SEU.

The format of SEU is known to modules within this level only. The level above will pass to this level a bit string of data to be stored as a unit in return for an id, and retrieve this bit string back by presenting to this level the id. The Memory Management Level will allocate a SEU for each unit of data to be stored, and put the data in the DATA field of the SEU. It then finds a free area in the virtual memory and passes the SEU to the Storage Hierarchy.

# 5.1.2 SYSTEM DATABASES AND DATA DEFINITION MODULES AT THE MEMORY MANAGEMENT LEVEL

Presently a very simple memory management function is provided. Storage in the virtual memory is assigned incrementally starting from address 16. Therefore the only "system database" needed is a counter indicating the next

available virtual address. This counter is stored in address 0 of the Storage Hierarchy.

No data dictionary is used in the current version. There is also no data definition necessary.

### 5.1.3 DATA MANIPULATION MODULES AT THE MM LEVEL

There are four T-proc modules at this level to perform creation, deletion, modification and retrieval of data elements. Each of these functions is performed by one module.

CRT. This module responds to requests from the upper level to store data elements. Its calling control block contains the data and the length, while the return control block contains an ID, which is the bit representation of the virtual address assigned to the SEU encompassing the data. This module calls subroutine GMEM to get the virtual address, and subroutine PSEU to decompose the SEU into 8-byte packets and to store them into the Storage Hierarchy.

RET. This module processes requests to retrieve a data elements given its id. It calls subroutine GSEU to retrieve the

SEU of the data element from SH using the id and extracts the DATA portion of the SEU to return to the upper level.

MOD. This module processes requests to modify content of a data element given its id and new data. Like RET, it calls GSEU to retrieve the SEU of the data element from SH and replaces the DATA field of the SEU with the new data, and calls PSEU to put it back into SH.

<u>DEL.</u> This module processes requests to delete a data element given its id. It calls GSEU to retrieve the SEU, sets its INVAL field, and calls PSEU to put it back. No garbage collection is performed in the present implementation.

#### 5.1.4 INITIALIZATION AT THE MEMORY MANAGEMENT LEVEL

MINIT. This module performs all the necessary steps to initialize this level during IPL. The calling control block contains the method of initialization ('file' or 'new'). If it initializes from a Storage Hierarchy that doesn't contain any data yet (i.e., a 'new' initialization), it bootstrap a value '16' into the first word of the Storage Hierarchy, which is to be used as a register for the next available address. If it initializes from an existing database, it retrieves a one-word

'key' for the upper level from a fixed location in SH and includes it in the return control block. (The upper level will use this key to 'recover' its system databases.) This module also provides an interface (i.e., when the OP field of the calling control block contains 'S') for the upper level to store a key.

#### 5.1.5 SUBROUTINES AT THE MEMORY MANAGEMENT LEVEL

There are 4 subroutines at this level. GMEM (Get MEMory) returns a virtual address of a free area in SH given the length of the area requested. PSEU (Put SEU) decomposes a given SEU into 8-byte packets and stores them consecutively into a given area in SH. GSEU (Get SEU) performs the reverse of the task of PSEU: given an address of an area, reconstruct the SEU contained in that area by retrieving a packet at a time from SH. And, finally, PAKT (PAcKeTing) is a subroutine called by the above 3 subroutines to get a packet of data from SH given its byte address. PAKT is the only routione in the FSTV which is aware of the interface to the top level of SH. The interface is declared as a data structure ARG.

## 5.2 INTERNAL SCHEMA LEVEL

This level provides various 'stored structures' to store the database. It accepts definitions of data element sets and their relationships, and performs search, retrieval and update of these data.

### 5.2.1 DATA STRUCTURES AT THE INTERNAL SCHEMA LEVEL

This level envisions that the world is composed of a network of some basic data elements called Primitive elements (P-elements.) P-elements and their relationships are implemented at this level in the form of a Basic Encoding Unit (BEU). The reader is referred to section 2.5 for a description of the BEU concept employed in this implementation. A BEU is declared as follows:

/\*DCL OF BASIC ENCODING UNIT (BEU) USED IN THE N-ARY LEVEL\*\*\*/
DCL 1 BEU BASED(P),

- 2 NUMPTR FIXED BIN,
- 2 ID ARRAY(I REFER (BEU.NUMPTR))BIT(32) INIT ((I)UNSPEC(NULL)),
- 2 DLEN FIXED BIN,
- 2 DATA BIT(J REFER (BEU.DLEN));

where ID\_ARRAY is an array of ID's of related BEUS'. NUMPTR indicates the number of slots its ID\_ARRAY contains, DATA is the bit string of the data element, and DLEN indicates the length of the data in terms of number of bits.

The format of the BEU is known only to this level. The upper level is not aware of how PSETs and their inter-relationships are stored.

# 5.2.2 SYSTEM DATABASES AND DATA DEFINITION AT INTERNAL SCHEMA LEVEL

Definition of Psets and Bsets are kept in two catalogues: the Primitive Set Cataloge (PCAT) and the Binary Association Set Catalogue (BCAT). Each entry in PCAT describes a primitive set. Its format is described by the following declaration:

/\*DCLS OF PSET CATALOGUE AT THE N-ARY LEVEL\*\*\*\*\*/
DCL 1 PINFO,

- 3 NUMPTR FIXED BIN,
- 3 PLEN /\*IN NUMBER OF BYTES\*/ FIXED BIN,
- 3 PTYPE CHAR (1), /\*'N' OR'X' OR 'B' OR 'C'\*/
- 3 LTYPE BIT (8), /\*'00000001' IS LINK LIST\*/

- 3 L\_ID BIT (32), /\*ID OF THE FIRST BEU IN THIS SET\*\*/
- 3 L\_POS FIXED BIN , /\*POS IN ID\_ARRY USED FOR LINEAR CHAINING
  OF BEU'S WITHIN THIS SET\*/
- 3 L\_POS2 FIXED BIN,
- 3 MAP BIT (32); /\*UP TO 16 PTRS ARE ALLOWED FOR A BEU\*/

where NUMPTR describes the size of the ID\_ARRAY of the BEU's in this Pset; PLEN is the legnth of the data element; PTYPE describes the data type of this primitive set, which can be numeric, bit or character string; PTYPE 'X' is a special type which is used when the data value of the Pset in question is insignificant (in this case the Pset is mainly used as an anchor for binary associations); L\_POS and L\_POS2 are the ID\_ARRAY slots used for forward and backward chaining of all BEU's in the Pset; MAP is used to record assignment of ID\_ARRAY slots: if the n-th slot is assigned, the n-th bit in MAP will be set; LTYPE describes how BEU's in this Pset are grouped together: currently only the bi-directional link list is in use. Among these parameters, NUMPTR, PLEN and PTYPE are provided by the upper level (refer to the description of DEFP below), while the rest are internally generated.

Each entry in BCAT describes a binary association set. Its format is described by the declaration of BCAT:

/\*DCL OF BCAT TEMPLATE\*/
DCL 1 BINFO,

- 2 PSETID(2) BIT (32),
- 2 POS FIXED BIN, /\*POS OF POINTER ARRAY OF PSETID1 USED \*/
- 2 FUNC CHAR (1); /\*'S' OR 'M'\*/;

where PSETID(1) and PSETID(2) contain the ID's of the source Pset and the targe Pset involved in this binary association (note that all binary associations are directional); POS conatins the ID\_ARRAY slot number used by BEU's in the source Pset to record the ID's of the associated BEU's in the target Pset; FUNC indicates the type of relationship between the source and the target: one-to-one ('S') or many-to-one ('M').

Both PCAT and BCAT are themselves implemented as Psets. Therefore each catalogue entry is implemented as a BEU. These two Psets are defined during system initialization (refer to section 5.2.4), creating the very first two PCAT entries of the system. This is exemplified by the following figure.

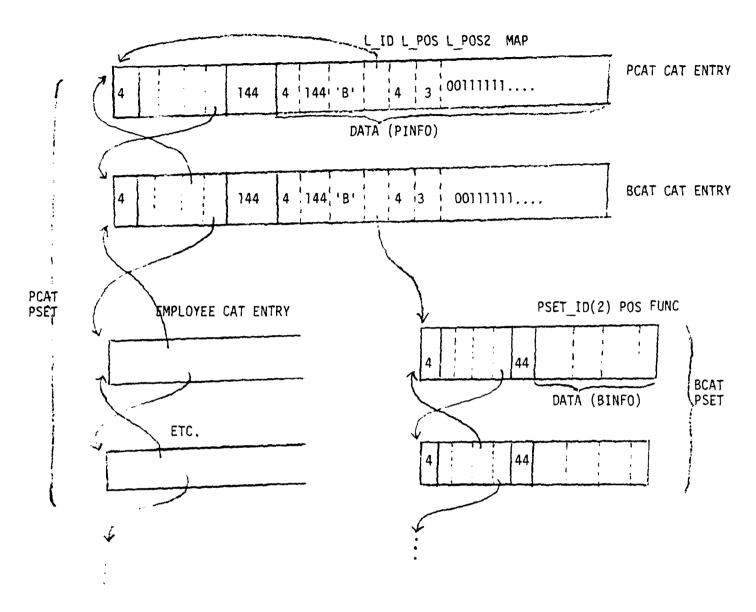


Figure: Structure of the Catalogue Implementation at the Internal Schema Level (N-ary Level)

To remember the ID's of the two BEU's that implement these two catalogue entries, two static variables are given values to during initialization: PCATID and BCATID. Their values will remain constant for the rest of the system processing. Procedures for defining Psets and Bsets will reference these two variables in order to insert new entries into the catalogue entry chain.

Two T-proc's form the data definition interface of this level. They are described below:

This module (DEFine Pset) responds requests for DEFP. primitive set definition. The calling control block contains the length and the type of the data field, and the size of the ID ARRAY. (It could be arqued that the last item shouldn't be passed since it relates to the internal, stored format of primitive elements which is theoretically unknown to its definer. Presently, however, it is included in the interface merely because a separate interface for the DBA to express his opinion this matter is lacking. This issue will be further discussed.) The return control block contains the ID of this Pset, which is (but the upper level shouldn't care) the ID that the Memory Management Level assigned to the catalogue entry BEU of this Pset.

DEFB. This module (DEFine Bset) responds to requests for binary association set defintion. The calling control block

contains the Pset ID's of the source and the target Psets involved and its relationship type (i.e., one-to-one, many-to-one). The return control block contains the ID assigned to this Bset, which is equivalent to the ID that the Memory Management Level assigned to the catalogue entry BEU of this Bset.

#### 5.2.3 DATA MANIPULATION AT THE INTERNAL SCHEMA LEVEL

This section describes the two T-proc's that form the data manipulation interface of this level: RETN and UPDN.

RETN. This module (RETrieval at iNternal schema level) accepts a reasonably complicated query expressed in a tree form in which nodes are Psets and arcs are Bsets. An arbitrary number of nodes can be included in the retrieval tree. As an example, a query of the form

RETRIEVE EMP (NAME, DEPT(DNAME), PROJ(NAME)) WHERE (AGE>50 AND DEPT(LOC) = 'New York')

can be expressed in a RETN tree shown in the following figure.

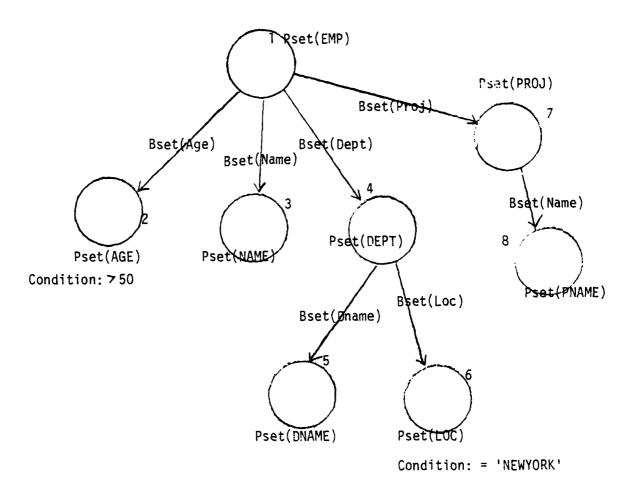


Figure: The RETN Tree of an Example Query

The caller of RETN passes a link list of RETN calling control blocks, each of the control blocks describing a node in the tree. The declaration of this control block is:

- DCL 1 RETN\_ARG BASED(P),
  - 2 LEN FIXED BIN (15) INIT (61),
  - 2 CBTP FIXED BIN (15) INIT( 25 ),
  - 2 PTR PTR INIT (NULL),
  - 2 NODE FIXED BIN (15) INIT(1), /\*NODE NUMBER\*/
  - 2 PSETID BIT(32), /\*PSETID OF THE NODE\*/
  - 2 PARENT FIXED BIN (15) INIT(0), /\*PARENT NODE NUMBER\*/
  - 2 BSETID BIT(32), /\*BSETID OF THE PARENT PSET\*/
  - 2 GET BIT(8) INIT ('00000000'B), /\*SEE RETNGET FOR DETAIL\*/
  - 2 N FIXED BIN INIT(0), /\*NUMBER OF RELEVANT 'OR' PREDICATES\*/
  - 2 PRED (1),/\*IN CURRENT VERSION ONLY ONE PREDICATE EACH TIME IS ALLOWED; FUTURE VERSION MAY USE REFER OPTION TO N\*/
  - 3 CN FIXED BIN (15), /\*CONDITION NUMBER\*/
  - 3 SETOP BIT(8), /\*RELEVANT IF BSET IF MULTI-TARGET;
    NOT USED IN CURRENT VERSION\*/
  - 3 OP BIT(8), /\*COMPARISON OPS, SEE RETNOP FOR DETAIL\*/
  - 3 DLEN FIXED BIN (15) INIT(0), /\* LEN OF COMPARE DATA IN BYTES\*/
  - 3 DATA BIT(320); /\*40 BYTES MAXIMUM\*/

where NODE is the node number of the node being described, PARENT is the node number of the predecessor, BSETID is the ID of the Bset which leads the parent node to this node (i.e., the 'arc'), GET indicates whether all, any or none of the qualified

occurrences of this Pset are to be retrieved, and PRED describes restriction of values of this node (i.e., a predicate). N, CN and SETOP are currently unused.

RETN returns occurrences of the tree. The return data is a link list of the RETN return control blocks. Every control block in the link list describes one of the primitive data elements retrieved. The format of the return control block is:

- DCL 1 RETN\_RTN BASED(P),
  - 2 LEN FIXED BIN (15) INIT (4),
  - 2 CBTP FIXED BIN (15) INIT( 26 ),
  - 2 PTR PTR INIT (NULL),
  - 2 RTN\_CODE FIXED BIN INIT (0),
- 2 N FIXED BIN (15); /\*NUMBER OF INSTANCES OF ROOT NODE RETURNED\*/
  DCL 1 RETN\_RTN1 BASED(P),
  - 2 LEN FIXED BIN (15) INIT (46),
  - 2 CBTP FIXED BIN (15) INIT( 27 ),
  - 2 PTR PTR INIT (NULL),
  - 2 NODE FIXED BIN (15), /\*NODE NUMBER\*/
  - 2 INDX FIXED BIN (15), /\*IF MULTI OCCUR\*/
  - 2 DLEN FIXED BIN, /\*LEN OF DATA IN BYTES\*/
  - 2 DATA BIT(320); /\*DATA RETURNED\*/

As an example, suppose two employees are found to satisfy the previous query, the link list representing the return will look like that in the following figure.

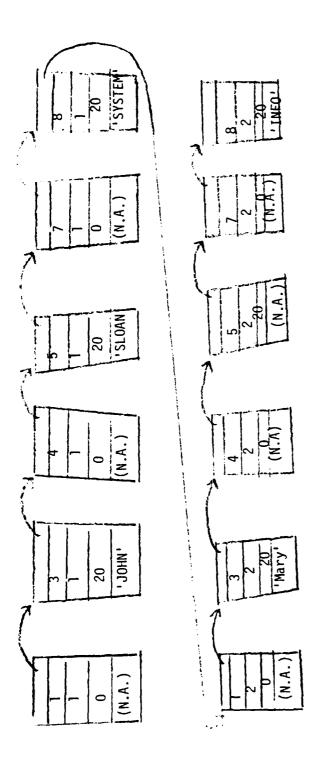


Figure: Examle RETN Return Control Block Link list (Based on the RETN Request shown in the Previous Figure)

This module, given the RETN request, uses a very simple method to traverse the database. It first visits the root node and obtains the first occurrence of the root node. It then verifies the occurrence of the rest of the tree against the predicate (if any). If the occurrence is found to be valid, a subroutine BUILD is called to generate the data and chain them to the return link If the occurrence is not valid, then it discards the current occurrence and gets the next occurrence of the root node. It continues this procedure until all occurrences in the root node are examined, or when one valid occurrence is found if the GET field of the root node in the request tree indicated 'ANY'. The way it verifies an occurrence is to follow the RETN tree to establish occurrences of its associated elements and to verify their content against their predicates. If any mismatch is found, the current occurrence is considered invalid and a new root occurrence started.

This module uses several subroutines to complete its procedure. RETP is called to retrieve the ID of the next P-element of a Pset on the forward chain of the Pset; RETB retrieves the ID of the associated P-element in a certain Bset of a P-element whose ID is given; VERIF verifies the value of a P-element against a predicate; and BUILD builds the RETN return control block link list based on a data structure CURSOR, which contains the ID's of P-elements of one occurrence of the tree. In addition, it calls GPCT and GBCT to obtain catalogue entries of relevant Psets and Bsets.

<u>UPDN</u>. This module (UPDate at internal schema level) creates, deletes and modifies data elements and their relationship in the database. Like RETN, the update argument is expressed in a tree called an UPDN request tree. The UPDN tree is slightly different from RETN tree in that the operations are different. However, the general fromat, i.e., a link list of control blocks each describing a node in the tree, is the same.

Update operations in a database ultimately include creating, deleting and modifying primitive data elements and their relationship to others. To alleviate the caller from the burden of creating individual P-elements one by one and then creating linkages among them one by one, the tree form enables it to express a meaningful aggregate of them in one UPDN request. For example, a database update request 'Remove employee John from Project A' can be translated by the levels above this level into a UPDN tree shown in the following figure.

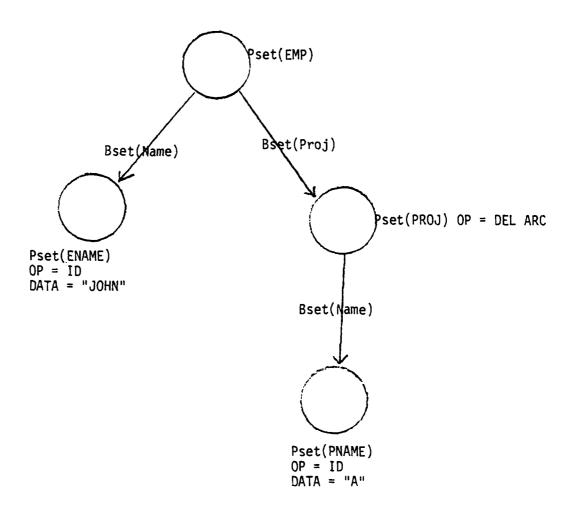


Figure: Example of a UPDN Tree

As shown in the figure, each non-root node carries with it an identifier for the arc (i.e., the Bset ID), an operation (i.e., OP) and possibly a data (i.e., ='John'). The possible operations are Insert arc, Delete arc, Replace arc, Create P-element and then insert arc, Delete arc and also the P-element, Replace value of P-element, and Identity. The identify operator is used when the node does not require any update but is included in the tree for the purpose of identifying the occurrence of its predecessor nodes. The root node operations are Delete, Create and Modify. (These operations are declared in the data structure UPDNOP.) In our example, the operation involved is to 'de-associate' the P-element representing employee John from the P-element representing Project A. Therefore an arc between these two P-elements must be deleted. However, to 'pin point' the occurrence of these two P-elements, two ID nodes are used (i.e., ENAME='John' and PNAME='A'.)

The UPDN request is expressed as a link list of control blocks UPDN\_ARG. Declaration of UPDN\_ARG is as follows:

DCL 1 UPDN ARG BASED(P),

- 2 LEN FIXED BIN (15) INIT (56),
- 2 CBTP FIXED BIN (15) INIT( 30 ),
- 2 PTR PTR INIT (NULL),
- 2 NODE FIXED BIN (15) INIT(1),/\*NODE NUMBER OF UPDN TREE\*/
- 2 PSETID BIT (32), /\*PSETID OF THE NODE\*/
- 2 PARENT FIXED BIN (15) INIT(0), /\*PARENT NODE NUMBER\*/

- 2 BSETID BIT (32), /\*BSETID OF PARENT PSET LEADING HERE\*/
- 2 OP FIXED BIN (15), /\*OP CODE FOR UPDN; SEE UPDNOP FOR DETAIL\*/
- 2 DLEN FIXED BIN (15) INIT(0), /\*IN NUMBER OF BYTES\*/
- 2 DATA BIT(320); /\*MAX 40 BYTES OF IMMED DATA \*/

where NODE, PSETID, PARENT and BSETID have the same meaning as those in RETN\_ARG described above, OP is the operation code, and DLEN and DATA are data to be created or data used to identify itself and others.

The UPDN\_RTN control block returns a return code either confirming the operation or indicating problems encountered in the processing.

The method used by UPDN to process a request is as follows:

1. Make a pass through the UPDN request to fill up a data structure TEMP which is used to remember all nodes which have any child node whose operation code is 'ID' (i.e., Identity); 2. Use TEMP, working from the bottom of the tree to top, resolve all predicates; reduce the original tree to a 2-level tree without any ID-operation nodes; 3. Pass the reduced tree to subroutines CRTN, DELN or MODN depending on UPDN.OP at the root node.

The UPDN module makes use of RETN to resolve identity of nodes which have child nodes with OP code 'ID'. Subroutines MODN, DELN and CRTN will further call CRTP, CRTB, DELP, DELB, REPP, and REPB

subroutines to perform actual update of BEU's based on the OP codes of the nodes in the reduced tree.

## 5.2.4 INITIALIZATION AT INTERNAL SCHEMA LEVEL

NINIT. This module (internal schema level INITialization) is invoked during IPL by the upper level to initialize system databases. It first invokes MINIT which performs initialization of all levels below. If initialization is 'file', then MINIT will return a one-word key which NINIT can use to recover its system databases by retrieving a BEU using the key as its ID. This BEU contains values for PCATID, BCATID and another key that NINIT shall return to the upper level. In this way NINIT sets up the static variable PCATID and BCATID, which are to be read-accessed by several modules in this level when normal processing starts.

If the initialization is 'new', then NINIT has to bootstrap its system databases. It does this by allocating the PCAT catalogue entry BEU and directly calls subroutine CRT1 to store it in the Storage Hierarchy. (CRT1 is a subroutine which interfaces with the CRT procedure at the MM Level.) Once PCAT catalogue entry is in the database, NINIT uses DEFP to define the second Pset of the system database: the BCAT Pset. After both

Psets are defined, PCATID and BCATID values will be set and NINIT then returns.

NINIT also provides an interface for the upper level to store a one-word key for that level. This key, together with PCATID and BCATID, will be stored as a BEU in the Storage Hierarchy. The ID of this BEU then becomes the key of this level, and is stored by calling the MINIT Store Key function.

## 5.2.5 SUBROUTINES AT INTERNAL SCHEMA LEVEL

Most of the subroutines in this level have been briefly described in the previous subsecton. There are 3 for catalogue management: GPCT (Get Pset CaTalouge entry), GBCT (Get Bset CaTalogue entry) and UPCT (UPdate Pset CaTalogue entry), 4 for retrieval operations: RETP (RETrieve next P-element), RETB (RETrieve the Binary associated element), VERIF (VERIFY) and BUILD, 6 for update operations: CRTP (CReaTe P-element), CRTB (CReaTe Binary association), DELP (DELete P-element), DELB (DELete Binary association), MODP (MODify P-element) and MODB (MODify Binary association), and 4 for interfacing with the MM Level: CRT1, DEL1, REP1 and RET1. The last group each interfaces with one procedure at the MM Level, and basically takes a BEU as input and generate appropriate request to be passed down.

# 5.3 ENTITY LEVEL

This level processes semantics of the database. It accepts definition of entity sets, attributes and constraints and responds to commands to manipulate entities.

## 5.3.1 DATA STRUCTURES AT ENTITY LEVEL

This level views the world as a collection of entities and attributes of these entities. This entity network data model has been described in section 2.2.

Mapping between the entity network and the data structures implemented in the Internal Schema Level is as follows. Every node in the entity network graph is implemented as a Pset, and every arc in the graph a Bset. While the Entity Level is responsible for making these Psets and Bsets known to the Internal Schema Level (through DEFP and DEFB calls), it is not concerned about how data in these sets are actually stored.

5.3.2 SYSTEM DATABASES AND DATA DEFINITION MODULES AT ENTITY LEVEL

This level keeps two catalogues: the entity catalogue and the attribute catalogue. An entry in the former describes an entity set and an entry in the latter describes an attribute of an entity set. These two catalogues are themselves implemented as two entity sets: E\*ESET and E\*ASET. They are displayed in the following figure.

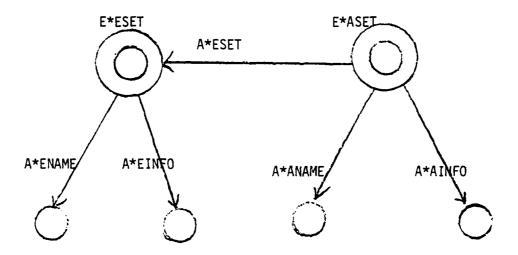


Figure: Catalogue structure at Entity Level

E\*ESET has two 'attributes' A\*ENAME and A\*EINFO. The former contains the name of the entity set this catalogue entry is describing, and the latter contains the ID of the Pset implementing this entity set, which is provided for by the Internal Schema Level in response to a DEFP request.

E\*ASET has three 'attributes'. A\*ANAME conatins the name of the attribute. A\*AINFO, an encoded attribute, contains a data structure declared as follows:

/\*\* CATALOGUE STRUCTURES AT THE ENTITY LEVEL\*\*\*\*/
DCL 1 AINFO,

- 2 BSETID BIT (32), /\*BSETID OF THIS ATTRIBUTE\*\*/
- 2 PSETID BIT (32), /\*PSETID OF TARGET NODE\*\*/
- 2 ENAME CHAR (8), /\*IF TARGET IS A ENTITY SET\*/
- 2 MAX FIXED BIN (31),
- 2 MIN FIXED BIN (31),
- 2 MLEN FIXED BIN,
- 2 FUNC CHAR(1),
- 2 TYPE CHAR (1),
- 2 VTYPE CHAR (1);

where BSETID is the ID of the Bset implementing the association between the Pset that implements the entity set this attribute belongs to and the Pset that implements the domain of this attribute. This ID is produced by the Internal Schema Level in response to a DEFB request. PSETID is the ID of the Pset

implementing the domain of the attribute. ENAME is the name of the domain entity set if this attribute is an entity attribute. TYPE specifies the type of this attribute (i.e., entity or value). If it is a value type attribute, VTYPE specifies the value type (i.e., character string or numeric), and MLEN specifies the maximum length in terms number of characters or number of digits this attribute will have, and MAX and MIN provide the value range of the numeric attribute. These parameters are given by the DBA during the data definition session described in section 2.2.

The third attribute of E\*ASET is A\*ESET. It is an entity attribute whose domain is the E\*ESET entity set. This attribute has a relationship type many-to-one, which means that many E\*ASET entities may be related to one E\*ESET entity. This attribute specifies the entity set this attribute belongs to.

Two T-proc's form the data definition interface at this level:

DEFE (DEFine Entity set) and DEFA (DEFine Attribute). They are invoked by the DDB module in the User Interface Level. Both modules will check a definition request against duplicate names. They will then call subroutines DFP1 and DFB1 to formulate DEFP and DEFB requests to be passed to the Internal Schema Level. To update catalogues, both modules make use of UPDE, the data manipulation module at this level, since the catalogues are themselves entity sets. This greatly simplifies the logic of these two modules.

Another module, <u>SHWE</u> (SHoW Entity level catalogue) will, when invoked, retrieve the catalogue entries and decode the attribute information for display by the User Interface Level. In retrieving catalogue entries, all three modules (DEFE, DEFA and SHWE) make use of subroutines GECT, GACT and ALLA, which will be described later.

#### 5.3.3 DATA MANIPULATION AT ENTITY LEVEL

RETE. This module (RETrieve Entities) is passed a tree-like retrieval request. The root node describes the entity set of which information is being requested, and the leaf nodes describe the attributes of interest of this entity set. Predicates on the attributes, if any, are passed along with the leaf nodes. The request is represented by a link list of RETE calling control blocks RETE\_ARG. Each control block describes one node in the retrieval tree. Declaration of RETE\_ARG is as follows:

DCL 1 RETE ARG BASED(P),

- 2 LEN FIXED BIN (15) INIT (61),
- 2 CBTP FIXED BIN (15) INIT( 21 ),
- 2 PTR PTR INIT (NULL),
- 2 NODE FIXED BIN (15) INIT(1), /\*NODE NUMBER\*/
- 2 NAME CHAR (8), /\*ANAME OR ENAME\*/

- 2 PARENT FIXED BIN (15) INIT(0), /\*PARENT NODE NUMBER\*/
- 2 GET BIT(8) INIT ('00000000'B), /\*SEE RETEGET FOR DETAIL\*/
- 2 N FIXED BIN INIT(0), /\*NUMBER OF RELEVANT 'OR'
  PREDICATES\*/
  - 2 PRED (1)/\*IN THIS VERSION ONLY ONE PREDICATE EACH TIME IS ALLOWED; IN THE FUTURE MAY USE REFER OPTION TO N\*/,
    - 3 CN FIXED BIN (15) INIT(1),/\*CONDITION NUMBER\*/
  - 3 SETOP BIT(8), /\*RELEVANT IF BSET IF MULTI-TARGET;
    NOT USED IN CURRENT VERSION\*/
  - 3 OP BIT(8), /\*COMPARISON OPS, SEE RETEOP FOR DETAIL\*/
- 3 DLEN FIXED BIN (15) INIT(0), /\* LEN OF COMPARE DATA IN BYTES\*/
  - 3 CDATA CHAR (40); /\*40 BYTES MAXIMUM\*/

where NODE and PARENT have similar meaning as those in the RETN\_ARG control block (section 5.2.3), NAME is either the entity set name if it is a root node, or the attribute name if it is a leaf node, GET indicates whether to get all, any or none of the qualified occurrences of this attribute. Under PRED, OP refers to a comparison operator (i.e., >, < or =), DLEN and CDATA are the length and the character form of the predicate data. N, CN and SETOP are currently not used.

The RETE module retrieves catalogue entries of all entity sets and attributes involved in the RETE request by subroutine calls to GACT and GECT, which retrieve attribute information and entity set information. Any undefined name found will cause the

request to be rejected with the unfound name pointed out. Catalogue information is also used to verify and transform the predicate values passed along with the request. Transformation is necessary since the internal representation of data may not always take the charactaer form. Data type transformation and verification are done through a subroutine VTPE. Once all these are done, a RETN request will be formulated and passed to the RETN module at the Internal Schema Level. When the latter returns, its answer set will be used to generate RETE's answer set, which is a link list of RETE\_RTN control blocks. The RETE\_RTN control block is similar to that of the RETN\_RTN control block except that DATA is now in character form ready to be displayed.

<u>UPDE</u>. This module (UPDate Entities) is invoked to create, delete and modify entities in the entity sets already defined. UPDE is also passed a tree-like request, where the root node describes the entity set of which occurrences are to be updated, and the leaf nodes describe the attributes which are either used to identify the occurrences to be updated, created or added to. The UPDE request and its return control blocks are similar to those of the UPDN module.

UPDE performs validity checking on the attributes being passed. Any violation of validity constraints defined for the values of the attributes will cause the request to be rejected entirely, with the faulty attribute pointed out. UPDE also calls

subroutines GECT, GACT and VTPE for catalogue retrieval and data type verification and transformation. After all these are done, UPDE formulates a UPDN request to be passed to the Internal Schema Level to update P-elements and their relationships.

UPDE returns a return code confirming the success of the operation or pointing out why it has failed.

VNME. This module (Verify NaMEs) is invoked by some User Interface Modules to verify the entity names and attribute names a user has typed in before he enters the data. This is provided so that a user will get a more responsive system interface. The calling control block VNME\_ARG contains an array of names structured in a tree form. VNME will verify these names against the catalogues at the Entity Level and point out problems if there is any.

#### 5.3.4 INITIALIZATION AT ENTITY LEVEL

VINIT. This module initializes system databases at this level. Like NINIT, when it is invoked, it first calls the initialization module at the lower level to initialize all the lower levels. Depending on the method of initialization (file or new), it either receives a one-word key back based on which it

recovers its system databases, or it has to bootstrap the system databases into the Storage Hierarchy.

To bootstrap its system databases which are the first two entity sets of the system, VINIT calls DEFP 6 times and DEFB 5 times to set up the Psets and Bsets involved in the catalogues. The 11 ID's thus generaged are then stored in yet another special Pset (the 7th Pset that VINIT has defined) by calling UPDN. The ID of the 7th Pset is then stored as the key of this level by invoking the Store Key function of the NINIT procedure. The 11 ID's are also retained in a static array KEY which can be read-accessed by the catalogue management subroutines GACT, GECT and ALLA at this level.

Another subroutine EBOT (Entity catalog BOotstrap) is called by VINIT to put into these 6 Psets and 5 Bsets the definition of the catalogues. (Since the catalogues are themselves entity sets with attributes, their definitions will be the first to appear as data in these Psets and Bsets.) EBOT uses 7 UPDN calls to accomplish this task.

If initialization is from an existent database, VINIT will retrieve the 11 ID's back by accessing the Pset whose ID is returned to VINIT by NINIT as the one-word key.

### 5.3.5 SUBROUTINES AT ENTITY LEVEL

The six subroutines have been introduced briefly in the previous subsections. Three are catalogue management subroutines: GECT (Get Entity CaTalogue entry), GACT Attribute CaTalogue entry) and ALLA (get ALL Attributes). is invoked by SHWE when the user wishes to find out all attributes defined for a particular entity set. All three modules make use of the KEY array to get the ID's of the Psets and Bsets forming the catalogues, and formulates a RETN request to obtain these data. Subroutines for retrieving attribute catalogue entries also perform the task of decoding a bit string into elements in the AINFO data structure for direct use by the caller.

Theoretically there is no need for a set of special retrieval routines just to retrieve the catalogue entries. Since the catalogue entries are themselves attributes of entities in the database, RETE should be able to accomplish the same task. special routines are devised mainly for performance reasons. RETE, as it turns out, is a very expensive module. Using RETE to catalogue entries retrieve would degrade performance dramatically. While performance of the system is not a primary concern at this stage, it was felt that this deviation from theoretical elegance worthwhile in the was current implementation. Performance of a multi-layered database

architecture is a future research issue which may provide clues to whether this deviation can be (or should be) avoided.

Another two of the subroutines, DFB1 and DFP1, are used to generate DEFB and DEFP requests in the proper format to be passed to the next level. Finally, subroutine VTPE (Verify TyPE) is used to verify and transfrom data passed along with the RETE or UPDE requests.

# 5.4 THE USER INTERFACE LEVEL

This level interacts directly with the user. It does not create or use any system database. Its function is primarily one which parses users' requests and generates in proper formats requests to be passed down to the Entity Level. Therefore the usual classification of modules into data definition, data manipulation and initialization modules is not used here.

#### 5.4.1 USER INTERFACE MODULES

USER. This module is invoked when a user 'logs on'. (Presently there is no security checking facility.) USER simply asks for the subsystem the user wishes to get in. Only DBA subsystem is currently available. USER then passes control to the DBA module.

DBA. This module (Data Base Administrator session) takes control when a user enters the DBA session. It calls various subsroutines depending on what the user wishes to do: data definition (DDB), data definition query (DDQ) or data manipulation (DDM). These three subroutines are described in the following paragraphs.

DDB. This module (Data Definition for Base schema) is invoked to interface with a DBA's request to do data definition for the base schema. (A base schema is a schema which describes the integrated database in terms of constructs in the entity network data model. It is different from a view schema which describes a view in terms of a data model which is not necessarily the base data model. Presently no view facility is available.) A user may define an entity set and then its attributes. He may also add attributes to an entity set defined previously. The DDB module interfaces with the user through a panel facility. The panel facility will display pre-defined panels at the user's terminal and allow the user to respond by filling out blanks on the panel.

This module will formulate DEFE and DEFA requests to be passed down to the Entity Level based on parameters the user specifies in the panels.

DDQ. This module (Data Definition Query) is invoked to display content of data definitions. Its major task is to formulate properly a SHWE request to be passed to the Entity Level. When SHWE returns, DDQ displays the result at the user's terminal.

<u>DMB.</u> This module (Data Manipulation for Base data) is invoked when a user enters a data manipulation session. It calls subroutines DMQ, DMC, DMM and DMD based on the type of manipulation operations. These subroutines are described below.

<u>DMQ.</u> This module (Data Manipulation - Query) accepts a user's query and parses it into meaningful tokens to be placed in a RETE request. It calls subroutin LEX to break the input characater string into tokens. Then it uses subroutine LEXT to recognize the tree structure of the query. Once data structures describing the tree have been produced by LEXT, DMQ formulates a RETE request and passes it to the Entity Level. Upon receiving return data from the latter, DMQ calls subroutine PRNT to display the result at the user's terminal.

<u>DMC.</u> This module (Data Manipulation - Creating entities) accepts a user's request to create entities in pre-defined entity

sets. The user first provides a list of attributes whose values will be provided when an entity is created. DMC will, like DMQ, call LEX and LEXT to build a tree out of the list of attribute names and formulate a VNME request to be passed to the Entity Level. The latter validates these names against the entity level catalogues. If no error is detected in the attribute list, DMC then asks the user to enter data for these attributes. Every line of data entered will cause one entity to be created. DMC uses subroutine UPE1 to input data lines and to formulate UPDE requests. Violation of constraints on data types or data values will be signaled through a return code from UPDE and DMC will display proper error messages based on the return code.

<u>DMM</u> and <u>DMD</u>. These two modules (Data Manipulation - Modify entities and Data Manipulation - Delete entities) are similar to DMC in thier operations.

#### 5.4.2 OTHER SUBROUTINES AT USER INTERFACE LEVEL

This subsection describes the 5 subroutines used by modules described in the previous subsection.

LEX. This module (LEXical analyzer) breaks input lines into tokens. Token delimiters recognized are ',' and ':'. Delimiters

enclosed in quotes are not treated as exceptions. More than one line of input can be strung together by ending previous lines in back slashes. Blanks can be optionally taken out of the input character string. However, blanks enclosed in quotes are not suppressed. This module returns an array TOKEN which contains the tokens and their lengths. (Note that the fact that delimiters found in quotes are not taken as exceptions means that this current implementation of lexical analyzer cannot accommodate data values that contain these special characters.)

LEXT. This module (LEXical Tree structure) is given the array TOKEN produced by subroutine LEX and is asked to identify the hierarchical structure of names and data values implied by the nested parantheses. For example, if TOKEN(1) is 'EMPLOYEE(', TOKEN(2) is 'EMPNAME' and TOKEN(3) is 'EMPADDR)', then EMPNAME and EMPADDR are the children names of the name EMPLOYEE. This module is also required to recognize non-name tokens. There are two types of non-name tokens: the modification operators (MOP) and the predicate values. The former is distinguished from regular name tokens by its special starting character '-'. The latter always trails a comparison operator ('=', '>', '<') behind a name. Therefore if a token is found to contain a comparison operator, it is broken into a name token and a value token. If a value is surrounded by quotes, the quotes are removed.

This module returns several data structures describing its parsing results. Array T1 contains the hierarchical structure of

names, array PRED contains value tokens and array MOP contains modification operators found in the input character string.

<u>UPE1.</u> This module (UPdE interface) is used by data update modules (DMC, DMD and DMM) to get input data and to formulate a UPDE request for each input line. The caller will pass to UPE1 the tree structure of enitity and attribute names that have been recognized by LEXT as well as the update operators (e.g., insert, delete, replace) corresponding to the input data items. UPE1 makes use of these data structures, calls LEX to break the input line into data items, and formulates proper UPDE requests to be passed to the Entity Level.

<u>VNM1.</u> This module (VNMe interface) is invoked by data update modules (DMC, DMD and DMM) to formulate proper VNME requests to be passed to the Entity Level. This is done to confirm the legality of entity and attribute names before accepting the update data from the user. This module is passed a data structure describing the tree structure of the names and will return a return code indicating any problem found.

PRNT. This module (PRINT) performs the task of displaying the result of a user query. It is passed a pointer pointing to the RETE\_ARG chain and a pointer pointing to the RETE\_RTN chain and will use information contained in these chains to display header lines and data lines at the terminal.

## 5.5 THE DRIVER MODULE - FSTV

The FSTV module is invoked by the Control Structure when starting the simulation run. It is the driver program of the Functional Hierarchy. The purpose of this module is to start up initialization of the entire Functional Hierarchy and to invoke the user session.

System Traces. FSTV first calls subroutine SETFH which sets up run time parameters. The only run time parameters used in the current implementation are the trace options. There are five types of trace options. The TCALL trace option will display messages when a T-proc is invoked as well as when it returns. This trace can be selected on a level basis. It is implemented through the TCALL program, since all T-proc invocations necessarily go through TCALL.

The system error message trace will display messages when an unusual situation is detected. This normally signals that some system software errors have been detected. This trace can also be turned on and off on a level basis.

The third type of trace is the memory request trace. If this is turned on, every data element that has been created, deleted or updated in the Storage Hierarchy will be displayed along with its virtual address. It displays these data elements using the

BEU format. It is implemented within subroutines CRT1, RET1, DEL1 and REP1.

The fourth type of trace is the Internal Schema Level data manipulation request trace. It displays all the requests that go into the RETN and UPDN modules. This trace is implemented within these two modules.

The last type of trace is the timing report option. It keeps track of the virtual CPU time consumed by each T-proc (including subroutine calls within the T-proc) and the number of times a T-proc is invoked. A sample timing report is shown in the following figure. This option is implemented through the TCALL module, and the result is displayed at the end of the run by the program FSTV.

<b>LEVEL</b>	PROCNAME	COUNT	TOT ELAPSED TIME	TOT RUN TIME	RUN TIME/INVOCATION
1	USER		1505283	80955	80955
ż		- :			
2	VINIT	1	123976	5233	5233
2	VNME	0	0	0	0
2	DEFE	0	0	0	0
2	RETE	1	1146343	17482	17482
2	UPDE	0	0	0	0
2	DEFA	0	0	0	0
2	SHWE	1	1424328	11921	11921
3	DEFP	0	0	0	0
3	DEFB	0	0	0	0
3	RETN	8	1503249	567142	70892
3	UPDN	0	o	0	0
3	NINIT	1	104 19	5637	5637
4	RET	138	939625	939625	6808
4	DEL	0	0	0	Q
4	REP	0	0	0	0
4	CRT	0	0	0	0
4	MINIT	1	1264	1264	1264
5	L1	801	180119	180119	224

Figure: Sample Timing Report

After SETFH is finished, FSTV invokes VINIT to initialize the Functional Hierarchy. Then FSTV invokes USER, the T-proc at the User Interface Level to start up the user session.

# 6.0 CONCLUDING REMARKS AND FUTURE DIRECTIONS

This report describes the current implementation of the Software Test Vehicle of the Functional Hierarchy of the INFOPLEX database computer. It provides an introduction to the STV project and the relationships among its various components, and documents the programming conventions used in FSTV.

This current version of FSTV is implemented with future research and expansions in mind. It is not meant to provide detailed performance statistics. Nor is it meant to incorporate all the functionalities that a large DBMS should have. However, it has provided some interesting insights into issues that ought to be explored further, and a basis for incorporating future efforts.

# 6.1 MEMORY MANAGEMENT LEVEL REVISITED

Segmentation and garbage collection are among the more important functions that are missing in the current

implementation. An interface which allows the upper level to define segments and to request that a certain element be stored in a pre-defined segment will produce a much more logical grouping of data elements in the virtual memory address space. This means that the Memory Management Level will maintain its own system database which describe the availability of each segment. Where and how this system database is maintained are also issues that need to be resolved.

## 6.2 INTERNAL SCHEMA LEVEL REVISITED

The purpose of this level is to provide the upper levels with powerful data structure management facility. capabilities implemented in the current version leave very much desired. In terms of functionalities, the binary association types, currently limited to one-to-one and many-to-one, should be expanded to include one-to-many and many-to-many. Accompanying this expansion is the enrichment of the set of primitives used to express retrieval and update Set-oriented primitives such as INCLUDE, BELONG TO, ALL and ANY are more efficiently processed at this level than at a higher level, therefore they ought to be included in the RETN The predicate structure should also include the OR requests. boolean operator. In addition, the INVERSE function should also

ALFRED P SLOAN SCHOOL OF MANAGEMENT CAMBRIDGE MA CEN--ETC F/6 9/2 FSTV: THE SOFTWARE TEST VEHICLE FOR THE FUNCTIONAL MIERARCHY OFF--ETC(U) JAN 82 M HSU CISC-M010-6201-09 NL AD-A116 591 UNCLASSIFIED 2 or 3

be provided for defintion of a binary association which is the inverse of one already defined. This provides more flexibility for the user in phrasing a query while leaves the access path selection problem entirely to the Internal Schema Level.

In terms of interface, the current definition and manipulation interface structure should be more flexible. For example, several Bsets whose source Psets are the same may be defined in one DEFB request. Additional construct defintion may be desirable. For example, an often used retrieval tree may be defined to be a construct such that future retrieval requests may simply cite the ID of that construct without constructing the same tree again. These enhancements will improve convenience of use as well as efficiency of operations.

Those described above are potential improvements that the upper level can see. Equally important are the improvements of internal processing. Intelligent query decomposition and more powerful search mechanisms will have to be incorporated to cope with problems of traversing a large data base. A preliminary design which further decomposes this level into two levels has been proposed, where the lower level is responsible for fast search in a flat file and the upper level is responsible for query decomposition and linkage of data. A major 'surgery' is expected on the current implementation in order to bring about these improvements.

## 6.3 THE ENTITY LEVEL REVISITED

The main purpose of this level is to build semantics and enforce constraints. One powerful arm in building semantics, the Virtual Information Facility, is largely missing in the current implementation. This facility may run parallel to the current level on a 'pipeline' basis. That is, retrieval requests will first pass through a 'virtual information filter' which transforms the request into one which contains only references to actual, stored entities and attributes. When the latter has been retrieved by the RETE facility, the return data will go through the second stage of the virtual information facility, a 'virtual information encoder', which will compute the virtual information values based on virtual information definitions. Architecturally this facility could lie above the Entity Level and form a Virtual Information Level; however, data structures being dealt with in this facility are the same as those in the Entity Level. That is to say, there will not be another level of data abstraction.

#### 6.4 LOCATION AND MANAGEMENT OF CATALOGUES AND WORKING BUFFERS

There exists a spectrum of design philosophies for a stratified architecture. On the one extreme, all software at one

level may be treated as 'data' at the next level, effecting a hierarchy of levels each of which implements its 'virtual address space' at the next lower level; on the other extreme, the software at one level is divided into two distinct parts; one part (i.e., code and catalogues) always exists at the local level, while the other part (e.g., user data) always exists at the next level (and eventually in the Storage Hierarchy.)

The strategy used in the preliminary design of the Functional Hierarchy is somewhere in between: catalogues and regular data are stored as data at the next lower level while program modules and their contexts reside within a level.

Intuitively, some duplication of cataluge and data within a level may be desirable based on performance considerations. As the FSTV runs show, catalogue retrievals at the higher levels consume a great percentage of the system processing power. This overhead may prove to be even more costly if the database is large and more functionalities are incorporated.

Another aspect in this issue is that of a 'stored procedure' at the lower levels. In other words, in addition to storing data at the next lower level, a level may choose to declare some frequently encountered requests to the next lower level, so that the next lower level may have some specialized, more efficient code to process them. This is analoguous to a 'compiled query' mechanism adopted in System R.

Yet another issue is that of a 'program module overfow'. As a level develops to include more functions, its program size may become too large to be all stored economically within the level's local memory. Less frequently used modules may be removed and stored as data at the next lower level, which in turn will store them as data at the next lower level, until it is stored as part of the data in the Storage Hierarchy. Similar arguments may be devised for a program context of a request that requires a large amount of buffer space.

However, while these are issues FSTV as exposed, they are not likely to be resolved without a rigorous investigation of tradeoffs among alternatives. It also requires efforts in designing additional algorithms that will ensure data integrity in the case of data duplication.

#### REFERENCES

- Blumberg81: Blumberg, B. INFOSAM A sample database management system.
  Master Thesis, Sloan School of Management, MIT (May 1981)
- Hsu80: Hsu, M. A preliminary architectural design for the Functional Hierarchy of the INFOPLEX database computer. TR #:M010-8011-05, Sloan School of Management, MIT (Nove 1980)
- Madnick79: Madnick, S.E. The INFOPLEX database computer: Concepts and directions. Proc. IEEE Computer Conference (Feb 1979)
- To81: To, T. Shell: A simulation for the Software Test Vehicle of the INFOPLEX database computer. Bachelor Thesis, Sloan School of Management, MIT (may 1981)

APPENDIX I

SAMPLE TERMINAL SESSION (a)

Cample Terminal Sexsion

ENTER TCALL TRACE OPTION (4 BITS)

: 0000 Enter system error message trace option (4 BITS)

: OCOOL ENTER MEMORY REQUEST TRACE OPTION (1 BIT):

-- FUNCTIONAL HIERARCHY STV CONSOLE PROGRAM--

INITIALIZATION: FILE OR NEW: FILE

FILE NAME?

fload file created in the promious sossion TEST20

FSTV CALLS VINIT

FSTV: VINIT RETURNS

SUBSYSTEMS: DBA, BV(BASE VIEW) OR RV(RELATIONAL VIEW)?

₽84 ...

-- DATABASE ADMINISTRATOR (DBA) SESSION --

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

: DD: BASE DATA (BASE) OR VIEW DATA (VIEW)

101

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

000

-- DATA DEFINITION QUERY SESSION --

ENTITY SET NAME? USE + IF ALL ENTITY SET NAMES ARE DESIRED.

e-tulunt all Entity Sets defined in the system

NUMBER OF ENTITY SETS DEFINED

PROJECTS
DEPT
EMPLOYEE
E+ASET
E+ESET

5 eartity sets in the syntanc

ENTITY SET NAME? USE . IF ALL ENTITY SET NAMES ARE DESIRED.

PROJECTS

ATTRIBUTE NAMES? SEPERATE BY COMMAS. USE . IF ALL ATTRIBUTES ARE DESIRED

Want all attributes defined for entity act protects

ENTITY SET NAME

ET NAME PROJECTS

ATTRIBUTE NAME FUNCTION TYPE ENAME

VTYPE MAX LEN MAX VALUE MIN VALUE

UNDER M:1 E DEPT
PROJUMIM KEY V
5
89999 -99999

3 attributes defined for PROJECTS

ENTITY SET NAME? USE \* IF ALL ENTITY SET NAMES ARE DESIRED.

ပ

<u>:</u>:

PROJNAME 20

EMPLOYEE

		EMPLOYEE
		NAME
		SET
••	•1	ENTITY

MIN VALUE					
MAX LEN MAX VALUE					
MAX					
LEN					
MAX					
VTYPE			Z	U	Ú
ENAME	DEPT	EMPLOYEE			
TYPE	ш	ш	>	>	>
FUNCTION	# #	 	o	:	:
ATTRIBUTE NAME FUNCTION TYPE ENAME	WORKS_IN	8088	AGE 2 99	EMPADDR 40	EMPNAME 20

ENTITY SET NAME? USE . IF ALL ENTITY SET NAMES ARE DESIRED.

DEPT

ATTRIBUTE NAMES? SEPERATE BY COMMAS. USE \* IF ALL ATTRIBUTES ARE DESIRED

:

ENTITY SET NAME DEPT

A VALUE		
MAX LEN MA		
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ENAM		
TYPE	<b>&gt;</b>	KEY
FUNCTION	÷ •	KEY
TRIBUTE NAME FUNCTION TYPE ENAME VTYPE MAX LEN MAX VALUE M	DEPTNAME 20	DEPTNUM

ENTITY SET NAME? USE . IF ALL ENTITY SET NAMES ARE DESIRED.

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

.. =

-- DATA MANIPULATION SESSION --

DM: ENTER MANIPULATION COMMAND:

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

CAT + enter CREATE DESSION

CREATE: ENTER ENTITY SET NAME

ENTER NAMES OF ATTRIBUTES SEPARATED BY COMMA

DEPTNUM, DEPTNAME

ENTER DATA: 15,'Sloan School'

14, Economics

CREATE: ENTER ENTITY SET NAME

· Claure CREATE SOSSION

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE) DM: ENTER MANIPULATION COMMAND:

OUE - Center QUERY asssion

--OUERY SESSION--

TYPE YES IF NEED HELP

ENTER ENTITY SET NAME

DEPT

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

: DEPTNAMÉ, DEPTNUM

ENTITY SET NAME DEPT

| DEPTNAME | DEPTNUM |

Answar to the query

--4

Economics

Sloan School'

ENTER ENTITY SET NAME

- Chair avery pession

DM: ENTER MANIPULATION COMMAND:

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

MOD & CENTER MODTEY DESSION TYPE YES IF NEED HELP

MODIFY: ENTER ENTITY SET NAME

DEPT

ENTER MUDIFICATION OPERATORS AND NAMES OF ATTRIBUTES SEPARATED BY COMMAS

the way to modify: identify by ceptilom, then noplace DEPTNAME - ID: DEPTNUM, - REP: DEPTNAME

change DEPTNAME of DEPT with DEPT NUM IS to Slown School ENTER DATA: 15, Sloan School

MODIFY: ENTER ENTITY SET NAME

( Deave modify sassion

DM: ENTER MANIPULATION COMMAND:

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

OUE & Chark to QUERY Session

TYPE YES IF NEED HELP

--QUERY SESSION--

ENTER ENTITY SET NAME

OEPT

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

DEPTNUM, DEPTNAME

ENTITY SET NAME

DEPT

OEPTNUM | DEPTNAME |

Economics 15 -

Sloan School

Answer to query

ENTER ENTITY SET NAME

DEPT

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

DEPTNAME, DEPTNUM=15 (a query with a predicate)

ENTITY SET NAME
DEPT
DEPTNAME | DEPTNUM |
| STOAN SCHOOL | 15 |

ENTER ENTITY SET NAME

DEPT

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

: DEPTNAME . 'Sloan School', DEPTNUM

ENTITY SET NAME DEPT

•

Answer

ENTER ENTITY SET NAME

Sloan School

Cleane Oney Session

DM: ENTER MANIPULATION COMMAND:

CRI (Ente: iteu): session)

CREATE(CRI), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

CREATE: ENTER ENTITY SET NAME

ENTER NAMES OF ATTRIBUTES SEPARATED BY COMMA

: DEPTNUM, DEPTNAME

ENTER DATA: 6.EE-Computer Science

21, Humanities

Counte two other DEPT untitled

CREATE: ENTER ENTITY SET NAME

DM: ENTER MANIPULATION COMMAND:

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

CREATE: ENTER ENTITY SET NAME

EMPLOYEE

ENTER NAMES OF ATTRIBUTES SEPARATED BY COMMA

: EMPNAME, EMPADDR, AGE, WORKS\_IN(DEPINUM)

ENTER DATA: Hoo-min Toong, E53-300, 50, 15

2 other Emphorece entitles

create

: Mike Abraham, somewhere in Somerville, 40,14

CREATE: ENTER ENTITY SET NAME

DM: ENTER MANIPULATION COMMAND:

CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

S..

--QUERY SESSION--

TYPE YES IF NEED HELP

ENTER ENTITY SET NAME

EMPLOYEE

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

EMPNAME, WORKS IN(DEPTNUM, DEPTNAME)
ENTITY SET NAME EMPLOYEE

| EMPNAME | WORKS\_IN (DEPTNUM | DEPTNAME) |

Economics Mike Abraham | Sloan School 5 Hoo-min Toong

ENTER ENTITY SET NAME

EMPLOYEE

ENTER ATTRIBUTE NAMES AND PREDICATE, SEPARATED BY COMMAS

EMPNAME, AGESS - Campiter girly with predicater

ENTITY SET NAME

EMPLOYEE

EMPNAME ! AGE

Answer to the query

Mike Abraham

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ENTER ENTITY SET NAME

DM: ENTER MANIPULATION COMMAND:

CREATE(CRI), MODIFY(MOD), DELETE(DEL), QUERY(QUE)

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

(get out

-- END OF DBA SESSION --

SUBSYSTEMS: DBA, BV(BASE VIEW) OR RV(RELATIONAL VIEW)?

-- END OF USER SESSION--

SAVE FILE: FILE NAME?

TESTEL EXCLUSION OF TEST OF

R; T=12.30/14.94 23:14:04 spool console stop

APPENDIX I

SAMPLE TERMINAL SESSION(b)

GENNOD FSTV MODULE Q ( FROM PLISTART R; T\*1.46/2.51 22:45:07

ENTER TCALL TRACE OPTION (4 BITS)

60000 (-1 than Off all traces)
ENTER SYSTEM ERPOR MESSAGE TRACE OPTION (4 BITS)

ENTER MEMORY REQUEST TRACE OPTION (1 BIT):

ENTER UPON/RETN REQUEST TRACE OPTION (1 BIT):

-- FUNCTIONAL HIERARCHY STV CONSOLE PROGRAM--

INITIALIZATION: FILE OR NEW: FILE

FILE NAME?

TESTIG already contains an initial database TEST 19 4-5-

FSTV CALLS VINIT

FSTV: VINIT RETURNS

SUBSYSTEMS: DBA, BV(BASE VIEW) OR RV(RELATIONAL VIEW)?

-- DATABASE ADMINISTRATOR (DBA) SESSION --

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

DD: BASE DATA (BASE) OR VIEW DATA (VIEW)

BASE

-BASE DATA DEFINITION SESSION-

YOU MAY DEFINE NEW ENTITY SETS OR ADD ATTRIBUTES TO EXISTING ENTITY SETS.

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

a panel session followed which defined an AGE attribute for an existing entity at emproyee ATTRIBUTE AGE

DEFINED

PRESS ENTER TO CONTINUE

Another panel ression defined the BOSS attribute

ATTRIBUTE BOSS

PRESS ENTER TO CONTINUE

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

La pariel 2055; on defined the DEPT entity sate ENTITY SET DEPT DEFINED

PRESS ENTER TO CONTINUE

ATTRIBUTE DEPTNUM defined here.

PRESS ENTER TO CONTINUE

ATTRIBUTE DEPTNAME dofined his

PRESS ENTER TO CONTINUE

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

ENTITY SET PROJECTS DEFINED

PRESS ENTER TO CONTINUE

LEATH DUTE PROTNEME NOTE AND ATTRIBUTE PROJUNANE DEFINED

PRESS ENTER TO CONTINUE

ATTRIBUTE PROJUM DEFINED

PRESS ENTER TO CONTINUE

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

OLD KACEINED attribute WORKS\_IN for EMPLOYEE

PRESS ENTER TO CONTINUE

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

ATTRIBUTE UNDER DEFINED DADER For PROJECTS entity set

PRESS ENTER TO CONTINUE

NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?

DD: BASE DATA (BASE) OR VIEW DATA (VIEW)

DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINITION QUERY (DDQ)?

-- END OF DBA SESSION --

SUBSYSTEMS: DBA, BV(BASE VIEW) OR RV(RELATIONAL VIEW)?

. TEST20 TEST20 IS NOT A VALID COMMAND

SUBSYSTEMS: DBA, BV(BASE VIEW) OR RV(RELATIONAL VIEW)?

-- END OF USER SESSION--

SAVE FILE: FILE NAME?

1EST20 ( Save a TEST20)

TEST ENDS

R; T=9.86/12.17 22:59:08 spool console class h start R; T=0.01/0.02 23:00:41

## APPENDIX 2

MACRO DECLARATIONS

(Control Blocks, Catalogues, Entries)

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/*THE FOLLOWING FIELD IS NOT USED IN CURRENT VERSION ,
3 REV_LINK FIXED BIN (15); WHICH DESCRIBES THE IMP OF REV LINK*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MLEN FIXED BIN, /*DEFAULT IS 20*/
MAX FIXED BIN(31), /*DEFAULT IS 99999*/
MIN FIXED BIN(31), /*DEFAULT IS 99999*/
ENAME CHAR (8) INIT ((8)''),
FUNC CHAR (1) INIT('');/*'S' FOR 1:1,'M' FOR M:1,'K'FOR KEY*/
DEFA_RTN BASED(P),
LEN FIXED BIN (15) INIT (2),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2 EMB FIXED BIN INIT(1), /*TARGET ELEM EMBEDDED IN SOURCE ELEM*/
2 POINTER FIXED BIN INIT (3), /*POINTER CONNECTION*/
/*THE FOLLOWING ARE NOT USED IN CURRENT VERSION*/
2 FEMB FIXED BIN INIT (2), /*FREE FORMAT EMBEDDING*/
2 NONE FIXED BIN INIT (4); /*NOT IMPLEMENTED, RELY ON REVERSE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ), /*PSETID OF THE ORIGINATING PSET AND THE TARGET PSET OF THIS BINARY RELATION*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FUNC CHAR (1), /+'S'=SINGULAR(I.E.,1:1), 'M'=MULTIPLE (I.E.,M:1), 1:N AND N:M NOT AVAILABLE IN CURRENT VERSION*/
                                                                                                                            DATA BIT(800); /+UP TO 100 BYTES LONG PER DATA UNIT+/
                                                                                                                                                                                                                                                                                                                               *DCLS OF ARGUMENTS TO COMMUNICATE WITH THE MODLE DEFA*/
                                                                                                                                                                                                                                                                                                                                                                                                             PTR PTR INIT (NULL),
ENAME: CHAR (8), /*PARENT ENTITY NAME*/
NAME CHAR (8) INIT ((8)''), /*ATTRIBUTE NAME*/
TYPE CHAR (1) INIT (''), /*'E'OR'V'*/
VTYPE CHAR (1) INIT (''), /*'N'OR'C'*/
MLEN FIXED BIN, /*DEFAULT IS 20*/
                                                                               PTR PTR INIT (MULL).
N FIXED BIN, /*LEN OF DATA IN BIT*/
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               1 CRT ARG BASED(P),
2 LEN FIXED BIN (15) INIT (102),
2 CBTP FIXED BIN (15) INIT(3),
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2 CBTP FIXED BIN (15) INIT (4),
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ID BIT (32);
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                                                                                                                                                                                                                                                                                                                                                                                                                                     2 PTR PTR INIT (NULL),
2 PTYPE CHAR (1), /+'C'=CHAR, 'N'=NUM, 'B'=BIT, 'X'=NULL*/
/*NULL TYPE PSET IS A PSET OF TOKENS WHICH DO NOT CONTAIN
VALUE DATA. RETRIEVAL OF NULL TYPE PSET RESULTS IN
A RETURN DATA WITH LENGTH O.****/
2 PLEN FIXED BIN (15), /*LEN OF PRIMITIVE ELEM OF THE PSET,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       3 HOW BIT (8), /*SEE DEFPHOW FOR DETAIL*/
3 NUMPTR FIXED BIN (15); /*RELV ONLY IF HOW = SA*/
                                                                                                          /*DCLS OF ARGUMENTS TO COMMUNICATE WITH THE MODLE DEFE*/
DCL 1 DEFE_ARG BASED(P),
2 LEN FIXED BIN (15) INIT (8),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTR PTR INIT (NJLL),
RIN_CODE FIXED BIN (15), /+O IS D.K.+/
PSETID BIT (32); /+ID OF PSET JUST DEFINED+/
                                                                                                                                                                                                                                                                CBTP FIXED BIN (15) INIT( 10 ).
PTR PTR INIT (NULL),
RTN CODE FIXED BIN (15) INIT (0);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DEL_ARG BASED(P),
LEN FIXED BIN (15) INIT (4),
CBTP FIXED BIN (15) INIT( 13),
CBTP FIXED BIN (15) INIT (12),
                                                                                                                                                                                        PTR PTR INIT (NULL),
NAME CHAR (8) INIT ((8)'');
DEFE_RIN BASED(P),
LEN FIXED BIN (15) INIT (2).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LEN FIXED BIN (15) INIT (2).
CBTP FIXED BIN (15) INIT( 14).
                                                                                                                                                                                                                                                                                                                                                                                                   FIXED BIN (15) INIT (6).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2 SA BIT(8) INIT ('00000001'B),
2 EMB BIT (8) INIT ('00000000'B);
1 DEFP RTN BASED(P),
2 LEN FIXED BIN (15) INIT (6).
                                                                                                                                                                                                                                                                                                                                                                                                                   2 CBTP FIXED BIN (15) INIT( 11 ).
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                                                                                                                                                                  CBTP FIXED BIN (15) INIT( 9 ).
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                                   PTR PTR INIT (NULL),
RTN_CODE FIXED BIN INIT (0)
                                                                                                                                                                                                                                                                                                                                                            /*ARGUMENT DCLS FOR T-PROC DEFP*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PTR PTR INIT (NULL).
                                                                                                                                                                                                                                                                                                                                                                                 BASED(P),
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                                                                       BSETID BIT(32);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   10 817(32);
                                                                                                                                                                                                                                                                                                                                                                               DCL 1 DEFP_ARG
2 LEN F
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MACL 1B

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 F 1A00030
                                                                                                                                                   PTR PTR INIT(NULL()),
RIN_CODE FIXED BIN (15) INIT (0), /+0-0.K.+/
KEY BIT(32); /+KEY VALUE RETURNED IN A FILE INIT+/
                                                                                                                                                                                                                                                                                                                                                                                       PTR PTR INIT(MULL()),
RIN CODE FIXED BIN (15) INST (0), /+0=0.K.+/
KEY BIT(32); /+KEY VALUE RESURNED IN A FILE INIT+/
                                                                                                                                                                                                                  1 NINIT ARG BASED(P),
2 LEN FIXED BIN (15) INIT(13),
2 CBTP FIXED BIN (15) INIT(17),
2 PTR PTR INIT(NULL()),
2 OP CHAR (1), /*1'=INIT, 'S'=STORE KEY*/
2 FNAME CHAR(8), /*NAME OF FILE*/
2 KEY BIT(32);
1 NINIT RTN BASED(P),
2 LEN FIXED BIN (15) INIT(6),
2 CBTP FIXED BIN (15) INIT(18),
LEN FIXED BIN (15) INIT(13),
CBIP FIXED BIN (15) INIT(15),
PTR PIR INIT(NULL()),
OP CHAR (1), /*'I'*INIT, 'S'*STORE KEY*/
FNAME CHAR(8), /*NAME OF FILE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ID BIT (32),
N FIXED BIN, /+LEN OF DATA IN BIT+/
DATA BIT(800); /+UP TO 100 BYTES LONG+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N FIXED BIN, / LEN OF DATA IN BIT ./
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LEN FIXED BIN (15) INIT (104),
CBTP FIXED BIN (15) INIT( 20 ),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FIXED BIN (15) INIT (106), FIXED BIN (15) INIT (1),
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CBTP FIXED BIN (15) INIT (19).
PTR PTR INIT (NULL).
                                                                                 KEY BIT (32);
MINIT RIN BASED(P).
LEN FIXED BIN (15) INIT(6),
CBTP FIXED BIN (15) INIT( 16 ),
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2 LEN
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                                                                                                                                                                                          2 NODE FIXED BIN (15) INIT(1), /*NODE NUMBER*/
2 NAME CHAR (8), /*ANAME OR ENAME*/
2 PARENT FIXED BIN (15) INIT(0), /*PARENT NODE NUMBER*/
2 GET BIT(8) INIT ('OOCOCOO'O'8), /*SEE RETEGET FOR DETAIL*/
2 NETICED BIN INIT(0), /*NUMBER OF RELEVANT 'OR' PREDICATES*/
3 PRED (1)/*IN THIS VERSION ONLY ONE PREDICATES*/
4 FIACLOWED: IN THIS VERSION ONLY ONE PREDICATE EACH TIME IS
5 CN FIXED BIN (15) INIT(1),/*CONDITION NUMBER*/
3 SETOP BIT(8), /*RELEVANT IF BSET IF MULTI-TARGET:
5 NOT USED IN CURRENT VERSION*/
5 OCATA CHAR (40);/*40 BYTES MAXIMUM*/
5 COATA CHAR (40);/*40 BYTES MAXIMUM*/
5 THE ARGI BASED (P), /*USED FOR VERSION*/
5 THATE.ARGI PARTENTAL PARTENTAL PARTENTAL PARTENTAL PARTENTAL PARTEN
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RIN_CODE FIXED BIN INIT (0),
N FIXED BIN (15); /*NUMBER OF INSTANCES OF ROOT NODE RETURNED*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2 CBTP FIXED BIN (15) INIT(23),
2 PTR PTR, /*POINT TO THE NEXT RETE_ARG*/
2 N FIXED BIN, /* # OF ELEMENTS IN THIS IMMED. VALUE SET*/
2 VALUE (I REFER(RETE_ARG1.N)) CHAR(40); /*MAX OF 40 BYTES*/
RETEVALUE_LEN FIXED BIN (15) INIT (40);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ANY BIT(8) INIT ('000000118),
ALL BIT (8) INIT ('000000118),
NO BIT (8) INIT ('00000000'B); /*NOTE ROOT NODE CANNOT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASSUME THIS VALUE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            *NOT USED IN CURRENT VERSION*/
2 LEN FIXED BIN INIT (8 ), /*PLUS VALUE LEN*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GT BIT(B) INIT ('00000010'B),
LT BIT(B) INIT ('0000001'B),
BEL BIT(B) INIT ('00000011'B),
NULL BIT (B) INIT ('00000100'B); /*NOT SPECIFIED*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DLEN FIXED BIN, /*LEN OF DATA IN BYTES*/
CDATA CHAR(40); /*DATA RETURNED*/
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INDX FIXED BIN (15), /+IF MULTI OCCUR+/
2 DATA BIT(800); /+UP TO 100 BYTES LONG+/
                                                                                                FIXED BIN (15) INIT (61),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FIXED BIN (15) INIT (46).
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                                                                                                                                    CBTP FIXED BIN (15) INIT( 21 ),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EQ BIT (8) INIT ('00000000'B),
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                                                                  BASED(P)
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                                                                  I RETE ARG
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                                                                                                                                                                                                                                               3 OP BIT(8), /*COMPARISON OPS, SEE RETNOP FOR DETAIL*/
3 DLEN FIXED BIN (15) INIT(0), /* LEN OF COMPARE DATA IN BYTES*/
3 DATA BIT(320); /*40 BYTES MAXIMUM*/
RETNPRED_LEN FIXED BIN INIT (46);
1 RETN_ARG1 BASED (P), /*USED FOR 'BELONG' COMP OP*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          N FIXED BIN (15); / + NUMBER OF INSTANCES OF ROOT NODE RETURNED +/
            PTR PTR INIT (MULL),
NODE FIXED BIN (15) INIT(1), /*NODE MUMBER*/
PSETID BIT(32), /*PSETID OF THE NODE*/
PARENT FIXED BIN (15) INIT(0), /*PARENT NODE NUMBER*/
BSETID BIT(32), /*BSETID OF THE PARENT PSET*/
GET BIT(3) INIT(3), /*SEE RETNGET FOR DETAIL*/
N FIXED BIN INIT(0), /*NUMBER OF RELEVANT 'OR' PREDICATES*/
PRED (1),/*IN CURRENT VERSION MAY USE REFER OPTION TO N*/
3 CN FIXED BIN (15), /*CONDITION NUMBER*/
3 SETOP BIT(8), /*RELEVANT IF BSET IF MULTI-TARGET;
                                                                                                                                                                                                                                                                                                                                                                             2 ARG LEN FIXED BIN INIT (8 ), /*PLUS VALUE LEN*/
2 PTR PTR, /*PDINT TO THE NEXT REIN ARG*/
2 N FIXED BIN, /* # OF ELEMENTS IN THIS IMMED. VALUE SET*/
2 VALUE (I REFER(REIN ARG; N)) BIT(320); /*MAX OF 40 BYTES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ND BIT (8) INIT ('00000000'B); /+NOTE ROOT NODE CANNOT
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NULL BIT (8) INIT ('00000100'B); /+NOT SPECIFIED+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PTR PTR INIT (NULL).
NODE FIXED BIN (15), /*NODE NUMBER*/
INDX FIXED BIN (15), /*IF MULTI OCCUR*/
DLEN FIXED BIN, /*LEN OF DATA IN BYTES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RETNVALUE LEN FIXED BIN (15) INIT (40);
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ALL BIT (B) INIT ('00000011'B),
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CBTP FIXED BIN (15) INIT( 25 ),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EQ BIT (8) INIT ('0000000'B), GT BIT(8) INIT ('00000010'B), LT BIT(8) INIT ('0000001'B),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CBIP FIXED BIN (15) INIT (36),
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NODE FIXED BIN (15) INIT(1),/*NODE NUMBER OF UPDE TREE*/
NAME CHAR(8),/*ENAME OR ANAME*/
PARENT FIXED BIN (15) INIT(0), /*PARENT NODE NUMBER*/
OP FIXED BIN (15), /*OP CODE FOR UPDE; SEE UPDE.OP FOR DETAIL*/
OLEN FIXED BIN (15) INIT (0), /*IN NUMBER OF BYTES*/
CDATA CHAR(40); /*MAX 40 BYTES OF IMMED DATA */
                                                                                                                                                                                                                                                                                                                                                             /* THE FOLLOWING SAME AS AINFO +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IST FIXED BIN INIT(2), /*INSERT ATTR*/
ADD FIXED BIN INIT(3), /*ADD ATTR*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FIXED BIN (15) INIT (56),
                                                                                                                        3 CBTP FIXED BIN (15) INIT (2), 3 CBTP FIXED BIN (15) INIT (37),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      / THE FOLLOWING NOT USED CURRENTLY
                                                                                                                                                                                                                                                                                    3 CBTP FIXED BIN (15) INIT (38), 3 PTR PTR INIT (NULL),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CBTP FIXED BIN (15) INIT (28 ).
                                                                                                                                                                                                                                                                      3 LEN FIXED BIN (15) INIT (29)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (SHWE_ARG_P, SHWE_RIN_P) PTR; 1 SHWE_RIN2 BASED (SHWE_RIN_P),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             3 LEN FIXED BIN INIT (202).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CBIP FIXED BIN INIT (39).
                                                                                                                                                                                                 3 RIN_CODE FIXED BIN INIT (0);
                                                                                                                                                                                                                                  OCL I SHWE_RINI BASED (SHWE_RIN_P),
                                                                                    SHWE_RIN BASED (SHWE_RIN_P).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 3 PTR PTR INIT (NULL).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   3 NUM ENAME FIXED BIN, 3 ENAME (25) CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               3 ID FIXED BIN INIT(1),
                                                                                                                                                                                                                                                                                                                                            3 ANAME CHAR (8),
3 ENAME CHAR (8), /
3 MAX FIXED BIN (31),
3 MIN FIXED BIN (31),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DLEN2 FIXED BIN (15),
              3 NAME1 CHAR (8),
3 NAME2(25) CHAR (8),
3 NUM NAME2 FIXED BIN;
                                                                                                                                                             3 PTR PTR INIT (NULL).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BASED(P).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTR PTR INIT (NULL)
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                                                                                                                                                                                                                                                                                                                                                                                                                    MLEN FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      3 VIYPE CHAR (1);
                                                                                                                                                                                                                                                                                                                                                                                                                                     TYPE CHAR (1), FUNC CHAR (1),
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2 LEN
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2 DATA
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3 ADD FIXED BIN INIT(3), /*ADD ARC-FOR MULTI-TARG*/
5 SUB FIXED BIN INIT(4), /*DEL ARC*/
3 SUB FIXED BIN INIT (5), /*REPLACE ARC-FOR WULTI-TARG*/
5 SUB FIXED BIN INIT (6), /*REPLACE ARC-*/
5 OD FIXED BIN INIT (15), /*DELETE ARC AND TARGET NODE TOO*/
5 NULL FIXED BIN INIT (16), /*REPLACE VALUE OF TARG NODE*/
5 NULL FIXED BIN INIT (16), /*REPLACE VALUE OF TARG NODE*/
5 NULL FIXED BIN INIT (13), /*REPLACE CALUE OF TARG NODE*/
5 OF FIXED BIN INIT (13), /*CREATE TREE--ROOT NODE OP ONLY*/
5 OF FIXED BIN INIT (11); /*DELETE TREE--ROOT NODE OP ONLY*/
5 OF FIXED BIN (15), INIT (2),
                                                                                                                                                                                                                                                                                                                                                       CETP FIXED BIN (15) INIT(30),
PTR PTR INIT (NULL),
NODE FIXED BIN (15) INIT(1),/*NODE NUMBER OF UPDN TREE*/
PSETID BIT (32), /*PSETID OF THE NODE*/
PARENT FIXED BIN (15) INIT(0), /*PARENT NODE NUMBER*/
BSETID BIT (32), /*BSETID OF PARENT PSET LEADING HERE*/
OP FIXED BIN (15), /*OP CODE FOR UPDN; SEE UPDNOP FOR DETAIL*/
DLEN FIXED BIN (15) INIT(0), /*IN NUMBER OF BYTES*/
DATA BIT(320); /*MAX 40 BYTES OF IMMED DATA */
                  3 SUB FIXED BIN INIT (6), /*SUBTRACT ATTR*/
3 REP FIXED BIN INIT (6), /*REPLACE ATTR*/
3 MOD FIXED BIN INIT (12), /*MODIFY ENTITY*/
3 CRT FIXED BIN INIT (13), /*CREATE ENTITY*/
3 DEE FIXED BIN INIT (11), /*DELETE ENTITY*/
3 NULL FIXED BIN INIT (0); /*NOT ASSIGNED BY USER*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /+NOT USED IN CURRENT VERSION+/
                                                                                                                                                                                                                                                              RIN_CODE FIXED BIN (15) INIT(0); /+0=0.K.+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTR PTR INIT (MULL),
OP CHAR(1), /*NOT USED IN CURRENT VERSION*/
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/*DEL ATTR*/
                                                                                                                                                                                                                                                                                                                 BASED(P),
FIXED BIN (15) INIT (56),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FIXED BIN (15) INIT (13),
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                                                                                                                                                                                          FIXED BIN (15) INIT (2).
                                                                                                                                                                                                            CBTP FIXED BIN (15) INIT( 29 ),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CBTP FIXED BIN (15) INIT( 32 ).
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FIXED BIN INIT(4).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          3 ID FIXED BIN INIT(1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DLEN2 FIXED BIN (15),
                                                                                                                                                                                                                                           PTR PTR INIT (NULL),
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                                                                                                                                                                     UPDE_RTN BASED(P).
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DATA2 BIT (320).
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /*** DCLS OF STATIC KEYS USED AS THE ENTITY LEVEL ****/
/*** ONLY MODULE VINIT HAS THE WRITE ACCESS: OTHER MODULES R/O**/
DCL KEY (11) BIT (32) EXT STATIC;
DCL 1 KY /*INDEX OF 11 KEYS*/ STATIC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2 PSETID(2) BIT (32),
2 POS FIXED BIN, /*POS OF POINTER ARRAY OF PSETID1 USED */
2 FUNC CHAR (1); /*'S' OR 'M'*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /+DCL OF BASIC ENCODING UNIT (BEU) USED IN THE N-ARY LEVEL+++/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2 BSETID BIT (32), /*BSETID OF THIS ATTRIBUTE**/
2 PSETID BIT (32), /*PSETID OF TARGET NODE**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CATALOGUE STRUCTURES AT THE ENTITY LEVEL***/
EINFO BIT (32); /*HOLDS PSETID OF A ENTITY SET**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ENAME CHAR (8), /+IF TARGET IS A ENTITY SET+/
                                                                                                                          VNME_ARG BASED(P),
LEN FIXED BIN (15) INIT (260),
CBTP FIXED BIN (15) INIT( 34 ),
1 VINIT RIN BASED(P),
2 LEN FIXED BIN (15) INIT (6),
2 CBTP FIXED BIN (15) INIT( 33),
                                                                                                                                                                                                                                                                                                                            FIXED BIN (15) INIT (4),
                                                                                                                                                                                                                                                                                                                                            CBTP FIXED BIN (15) INIT( 35 ).
                                                    PTR PTR INIT (MULL),
RIN_CODE FIXED BIN INIT (0 ),
KEY BIT(32);
                                                                                                                                                                                                                                                                                                                                                           PTR PTR INIT (MULL),
RTN CODE FIXED BIN INIT (O),
N FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2 PESET FIXED BIN INIT (1),
                                                                                                                                                                                                                                                    3 Tt (25),
4 PARENT FIXED BIN,
                                                                                                                                                                                2 PTR PTR INIT (NULL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAX FIXED BIN (31), MIN FIXED BIN (31),
                                                                                                                                                                                                                                                                                                       VNME_RTN BASED(P).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NUMPTR FIXED BIN,
                                                                                                                                                                                                                                                                                          4 ANAME CHAR(8);
                                                                                                                                                                                                                                                                                                                                                                                                                                     OF BCAT TEMPLATE+/
                                                                                                                                                                                                                   3 ENAME CHAR(8).
                                                                                                                                                                                                                                      3 TN FIXED BIN.
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TYPE CHAR (1),
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                                                                                                                           1 VNME ARG
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                                                                                                                                                                                                                                                                                                                                                                               LTYPE BIT (8), /*'00000001' IS LINK LIST*/
L ID BIT (32), /*ID OF THE FIRST BEU IN THIS SET**/
L POS FIXED BIN , /*POS IN ID ARRY USED FOR LINEAR CHAINING
OF BEU'S WITHIN THIS SET*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /*DCL OF SEU (STORAGE ENCODING UNIT) USED AT THE MM LEVEL AND THE ** STORAGE HIERARCHY VIRTUAL MEMORY: FOR INTEGRATED VERSION *****/
                                                                                                                                                                                                        SEU (STORAGE ENCODING UNIT) USED AT THE MM LEVEL AND THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      3 MAP BIT (32); /*UP TO 16 PTRS ARE ALLOWED FOR A BEU*/
1 PINFOLTYPE,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2 MOVE_PTR OFFSET(SH) INIT (MULL()) , NOT USED CURRENTLY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PLEN /*IN NUMBER OF BYTES+/ FIXED BIN, PTYPE CHAR (1), /*'N' OR'X' OR '8' OR 'C'*/
                                                                                                                                                                                                                                                                                                 '*DCLS OF PSET CATALOGUE AT THE N-ARY LEVEL*****/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 SEU BASED (0),
2 MOVE PTR OFFSET(SH) INIT (NULL())
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2 LL BIT (8) INIT ('00000001'B);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INVAL BIT(8) INIT ('00000000'B)
                               2 PASET FIXED BIN INIT (4).
2 PANAME FIXED BIN INIT (5).
2 PAINFO FIXED BIN INIT (6).
2 BENAME FIXED BIN INIT (7).
2 BEINFO FIXED BIN INIT (8).
                                                                                                                                                         BAINFO FIXED BIN INIT (11)
                                                                                                                       BESET FIXED BIN INIT (9),
BANAME FIXED BIN INIT (10)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DATA BIT (I REFER (SEU.N));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2 LEV1 BIT (1) INIT ('1'B),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2 LEVO BIT (1) INIT ('1'B),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2 LEV2 BIT(1) INIT (*1*B).
2 LEV3 BIT(1) INIT (*1*B).
2 LEV4 BIT(1) INIT (*1*B).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           BIT(1) INIT ('1'B);
PENAME FIXED BIN INIT PEINFO FIXED BIN INIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                          L POS2 FIXED BIN.
                                                                                                                                                                                                                                                                                                                                    NUMPTR FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DCL 1 SEU BASED (SEUPTR)
/* 2 MOVE PTR OFFSET(SI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 O OFFSET (SH);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    N FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LEV5
                                                                                                                                                                                                                                                                                                                   DCL 1 PINFO.
                                                                                                                                                                                               /**DCL OF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /*DCL OF
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F 1500040
F 1500050
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SVC00080
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SVC00130
                                                                          F 1F00020
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              DSE00070
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                             DSE00080
                                            DSE00090
                                                                                              F 1F00030
                                                                                                             F1F00040
                                                                                                                             F 1F00050
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                                                                                                                                                           F 1F00070
                                                                                                                                                                              F 1F00080
                                                                                                                                                                                               F 1F00090
                                                                                                                                                                                                             F 1 F 00 100
                                                                                                                                                                                                                                                            F 1500030
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SVC00110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AUPDN
DECAT
QFDEBUG
SVCTB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ADEFP
Aret
                                                                                                         2,2,2,3,3,
3,3,4,4,
4,4,4,5),
2 PROCNAME CHAR (8) INIT ('USER', 'VINIT', 'VNME', 'DEFE', 'RETE',
'UPDE', 'DEFA', 'SHWE', 'DEFP', 'DEFB',
'RETN', 'UPDN', 'NINIT', 'RET', 'DEL',
'REP', 'CRT', 'MINIT', 'L1');
                                                                             :
                                                                                                                                                                                                                                                                                                                                           DCL 1 PROC_TBL (18),
2 N CHAR(7) INIT ('VINIT', 'DEFA', 'DEFE', 'RETE', 'UPDE', 'SHWE',
                                                                                                                                                                                                                                                                                                                                                                                                         'RET', 'REP', 'CRT', 'DEL', 'MINIT', 'USER'),
2 LEVEL FIXED BIN INIT ((7)6,(5)5,(5)0,7);
/*NOTE THAT T-PROC'S 1-7 ARE IN THE ENTITY LEVEL (6) AND 8-12
ARE IN INTERNAL SCHEMA LEVEL (ASSIGNED LEVEL 5) AND T-PROC'S
13-17 ARE IN THE MEMORY MGMT LEVEL (ASSIGNED LEVEL 0). 'L1'
IS THE INTERFACE MODULE AT THE SH-STV (ASSIGNED LEVEL 1). */
                                                                                                                                                                                                                                                                                                                            THIS IS THE PROC_TBL TO BE INCLUDED IN THE SVCS1 ROUTINE **/
                                                                                                                                                                                                                                          /+ SIMULATED STORAGE HIERARCHY, KNOWN TO DUMFSTV, DUML1,FHL1 +/
DCL SH AREA (30000) BASED (SH_BASE);
DCL SH_BASE PTR EXT;
                                                                              /* ARCHITECTURAL LEVELS
                                                                                                                                                                                                                                                                                       DCL PACKET(3000) CHAR (8) BASED(PP), PP DFFSET(SH) EXT:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ADEFE
GAREP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AUPDE
DBEU
DSEU
SVCTB
                                                                                                                                                                                                                                                                                                                                                                                              'RETN', 'UPDN', 'DEFP', 'DEFB', 'NINIT',
                                                                                              (1,2,2,2,2,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PROC_TBL_LEN FIXED BIN INIT (18);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASHWE
10BCAT
EDPCAT
5SH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ANINI
           2 INVAL CHAR(1) INIT ('N'),
2 DATA CHAR(I REFER (SEU.N)),
                                                                                              2 LEVEL FIXED BIN(31) INIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AMINI
YARETN
#AVNME
DNKEY
FSTRUC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ADEFA
2 N FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                              V NAME Y
                                                                                1 ARCH(19)
                                               (SEUPTR) PTR;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ARETE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVINI
DKEY
DSEU1
                                                                              מכר
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ADEL
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MACL 18

FILE: ENTRY

LIBPDS  DCL VIPE ENTRY /*ENTRY DCL FOR MODULE VIPE*/  (1.2 BIT(32), 2 BIT(32), 2 CHAR(8),  2 FIXED BIN (31), 2 FIXED BIN (31),2 FIXED BIN,  2 CHAR (1), 2 CHAR(1), 2 CHAR (1), FIXED BIN,  BIT (320), CHAR(40),FIXED BIN,FIXED BIN);	F 1E00020 F 1E00030 F 1E00040 F 1E00050
DCL ALLA ENTRY /*ENTRY DCL FOR MODULE ALLA*/ (CHAR (8), (25) CHAR (8), FIXED BIN, FIXED BIN );	F 1E00020 F 1E00030
DCL GBCT ENTRY /*ENTRY DCL FOR MODULE GBCT WHICH RETRIEVES BINF*/ (BIT(32), 1,2 (2) BIT(32), 2 FIXED BIN, 2 CHAR(1), FIXED BIN);	F 1E00020 F 1E00030
/- /-ENTRY DCL OF MODULE BNV+/ DCL BNV ENTRY;	F 1E00020 F 1E00030
DCL CRIB ENTRY /*ENTRY DCL FOR MODULE CRIB*/ (BIT(32),BIT(32),BIT(32),BIT(*),CHAR(1),FIXED BIN);	F 1E00020 F 1E00030
DCL CRIN ENTRY /*ENTRY DCL FOR MODULE CRIN*/ (PTR,(25) BIT(1), FIXED BIN);	F 1E00020 F 1E00030
DCL CRIP ENTRY /*ENTRY DCL FOR MODULE CRIP*/ (BIT(32),BIT(*),BIT (32), FIXED BIN);	F 1E00020 F 1E00030
/*ENTRY DECL OF DBA MODULE*/ DCL DBA ENTRY;	F 1E00020 F 1E00030
/ DC, DDB ENTRY; /*ENTRY DCL FOR MODULE DDB*/	F 1E00020
DC, DDV ENTRY; /*ENTRY DCL FOR MODULE DDV*/	F 1E00020
DCL DELB ENTRY /*ENTRY DCL FOR MODULE DELB*/ (BIT(32),BIT(32),GIT(32),CHAR(1),FIXED BIN);	F 1E00020 F 1E00030
DCL DELN ENTRY /*ENTRY DCL FOR MODULE DELN*/ (PTR,(25)BIT (1), FIXED BIN);	F 1E00020 F 1E00030
DCL DELP ENTRY /*ENTRY DCL FOR MODULE DELP*/ (BIT(32),BIT(32),FIXED BIN);	F 1E00020 F 1E00030
) DCL DFB! ENTRY /*ENTRY DCL FOR MODULE DFB!*/ (CHAR(1), BIT (32), BIT(32), FIXED BIN, BIT(32));	F 1E00020 F 1E00030
) DCL DFP1 ENTRY (CHAR(1), FIXED BIN, CHAR(1), FIXED BIN, BIT(32));	F 1E00020
DCL DMB ENTRY; /*ENTRY DCL FOR MODULE DMB*/	F 1E00020
DCL GACT ENTRY /*ENTRY DCL FOR MODULE GACT*/ (CHAR(8),CHAR(8),1,2 BIT(32), 2 BIT(32), 2 CHAR(8), 2 FIXED BIN (31), 2 FIXED BIN (31),2 FIXED BIN, 2 CHAR (1), 2 CHAR(1), 2 CHAR (1), FIXED BIN);	F 1E00020 F 1E00030 F 1E00040 F 1E00050
/ DCL GECT ENTRY /*ENTRY DCL FOR MODULE GECT*/ (CHAR(8), BIT(32), FIXED BIN);	F 1E00020 F 1E00030

PAGE 002

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DCL LEX ENTRY /*ENTRY DCL FOR MODULE LEX*/ (FIXED BIN, 1 (25), 2 CHAR (40), 2 FIXED BIN, FIXED BIN, FIXED BIN);	F 1E00020 F 1E00030 F 1E00040
DCL LEXT ENTRY /*ENTRY DCL FOR MODULE LEXT*/  (FIXED BIN, 1 (25), 2 CHAR (40), 2 FIXED BIN, 1 (25), 2 FIXED BIN, 2 CHAR (8), FIXED BIN, 1 (25), 2 CHAR (1), 2 CHAR (40), 2 FIXED BIN, (25) CHAR(1), FIXED BIN);	F 1E00020 F 1E00030 F 1E00040 F 1E00050
DCL MODN ENTRY /*ENTRY DCL FOR MODULE MODN*/ (PTR,(25) BIT(1), FIXED BIN);	F 1E00020 F 1E00030
DCL MPST ENTRY /*ENTRY DCL FOR MODULE MPST*/ (BIT(32),FIXED BIN);	F 1E00020 F 1E00030
/*ENTRY DCL FOR PCAT SERVICE SUBROUTINES*/ DCL GPCT ENTRY /*ENTRY DCL FOR MODULE GPCT:GET PCAT*/ (BIT(32), 1,2 FIXED BIN, 2 FIXED BIN,2 CHAR(1), 2 BIT (8), 2 BIT (32), 2 FIXED BIN, 2 FIXED BIN, 2 BIT (32), FIXED BIN); DCL UPCT ENTRY /*ENTRY DCL FOR MODULE UPCT:UPDATE PCAT*/ (BIT(32),1,2 FIXED BIN, 2 FIXED BIN,2 CHAR(1), 2 BIT (8), 2 BIT (32), 2 FIXED BIN, 2 FIXED BIN, 2 BIT (32), FIXED BIN);	F1E00020 F1E00030 F1E00040 F1E00050 F1E00050 F1E00070
DCL PRNT ENTRY /*ENTRY DCL FOR MODULE PRNT*/ (PTR,PTR,FIXED BIN);	F1E00020 F1E00030
/*ENIKY DCL UP WUDULE KELV*/ DCL RELV ENIRY;	F 1E00030
DCL REPB ENTRY /+ENTRY DCL FOR MODULE REPB+/ (BIT(32),BIT(32),BIT(32),BIT(+),CHAR(1),FIXED BIN);	F 1E00020 F 1E00030
DCL SRCH ENTRY /*ENTRY DCL FOR MODULE SRCH*/ (BIT(32),BIT(*),BIT (32),FIXED BIN);	F 1E00020 F 1E00030
RET1 ENTRY /*ENTRY OCL FOR N-ARY LOW LEVEL (BIT(32), PTR, FIXED BIN);	F 1E00020 F 1E00030
UCL DELY ENIRY /*ENIRY DEL FUR N-ARY LOW LEVEL SUBROUTINE DELI*/ (BIT(32), FIXED BIN);	F 1E00050
	F 1E00030 F 1E00030 F 1E00090
/ DCL UPE: ENTRY /+ENTRY DCL FOR MODULE UPE:+/ (CHAR(1).1,2 CHAR(8),2 FIXED BIN,2 (25),3 FIXED BIN,3 CHAR(8), (25) CHAR(1), FIXED BIN);	F 1E00020 F 1E00030 F 1E00040 F 1E00050
/+DCL OF ENTRY FOR USER +/ DCL USER ENTRY;	EUS00020 EUS00030
DCL VNM1 ENTRY /*ENTRY DCL FOR MODULE VNM1*/	F 1E00020

MACL 1B

FILE: ENTRY

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HEX00010
HEX00020
HEX00030
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F 1E00050
 F1E00030
                    F1E00040
                                          F 1E00050
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                                                                                                                                                                                                                                                                                                                                                                    DCL SVCS1 ENTRY (CHAR(7), PTR, FIXED BIN);
DCL SVCS2 ENTRY (1,2 FIXED BIN,2 FIXED BIN,2 FIXED BIN, PTR, FIXED BIN);
DCL 1 MSG BASED (P),
                                                                                                                                                                                                                                                                                                                                                                                                                                   2 LEN FIXED BIN (15) INIT(12),
2 DUM CBTP FIXED BIN (15) INIT (0),
2 PTR PTR, /+PDINT TO ARG LIST*/
2 RTN_ADDR, /+ADDRESS OF THE PROCESS WHICH INITIATES THE MSG*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1. RETB ENTRY /+ENTRY DCL FOR MODULE RETB+/
(BIT(32) ALIGNED.1.2 (2) BIT (32),2 FIXED BIN.2 CHAR (1), PTR, PTR,
FIXED BIN);
                                                                                                    DCL TCALL ENTRY (CHAR(7), FIXED BIN, PTR, PTR);
DCL TRIN ENTRY (1, 2 FIXED BIN, PTR);
DCL SVC3 ENTRY (PTR);
DCL PROC NAME CHAR(7);
DCL 1 PROC_ADDR,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (1,2 FIXED BIN, 2 FIXED BIN, 2 BIT (8), 2 BIT (32), 2 FIXED BIN, 2 FIXED BIN, 2 BIT (32),
(1,2 CHAR(B),2 FIXED BIN,2 (25),3 FIXED BIN,3 CHAR(B), FIXED BIN, FIXED BIN);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ( 1, 2 FIXED BIN, 2 FIXED BIN, 2 CHAR (1), 2 BIT (8), 2 BIT (32), 2 FIXED BIN, 2 FIXED BIN, 2 BIT (32), PTR, BIT(8) ALIGNED.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       3 BOXID) FIXED BIN (15);
PROC_NAME CHAR(7); /*USED IF SVCS1 IS CALLED*/
1 PROC_ADDR, /*USED IF SVCS2 IS CALLED*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DCL VERIF ENTRY /+ENTRY DCL FOR MODULE VERIF+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      L BUILD ENTRY /*ENTRY DCL FOR MODULE BUILD*/
((25) PTR, (25) BIT(32) ALIGNED,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DCL HEX4 EXT ENTRY (PTR) RETURNS(CHAR(8));
/* ROUTINE TO CONVERT A PTR TO HEX STRING */
DCL HEX EXT ENTRY (PTR) RETURNS(CHAR(6));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DCL RETP ENTRY /*ENTRY DCL FOR MODULE RETP*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    BOXID) FIXED BIN (15);
                                                                                                                                                                                                                                                                                                                                               /+bcls of svc send services+/
                                                                                   /*SERVICE ROUTINES DCLS***/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FIXED BIN, BIT(1) ALIGNED);
                                                                                                                                                                                                                                                                                       BOXID) FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PTR, PTR, FIXED BIN);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        BIT(+) VAR ALIGNED,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (3 LĒVEL,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (2 LEVEL,
                                                                                                                                                                                                                                          (2 LEVEL,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     3 VPID.
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MONITOR						ECRTB	EDFP1	ELEXT	EUSER	<b><i><b>%EVERI</b></i></b>	yEGMEM	EPSEU
NAL				, •	, ,							
VM/SP CONVERSATIONAL MONITOR SYSTEM				/* ENTRY DCL FOR GSEU SUBROUTINE */	/* ENTRY DCL FOR PSEU SUBROUTINE */	EBNV	EDFB1	ELEX	EUPE 1	HEX.	<b>JEPAKT</b>	EPSEU
/sp				GSE	PSE					•	3	
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⋖	FIXE	V DC	); ((	18 0	0 61					ш		
MACL 1B	FIXED BIN, PTR, FIXED BIN);	PAKT ENTRY /*ENTRY DCL FOR MODULE PAKT*/ (FIXED BIN(31),CHAR(8),CHAR(1));	GMEM ENTRY /*ENTRY DCL FOR MODULE GMEM*/ (FIXED BIN,BIT(32));	GSEU ENTRY /- (BIT(32),PTR.FIXED BIN);	/ (BIT(32),PTR,FIXED BIN);	EALLA	EDELN	EGACT	ESRCH	>SERVICE	ERETP	EPSEU
	8 I N	NI B	NI B	NTRY 2),P	NIRY 2).P							
FILE: ENTRY	FIXED	PAKT EI (FIXED	GMEM E	GSEU ENTRY (BIT(32),P	_	_		_				
FILE:	PTR.	DCL )	oct )	) DOC	) DCL	EVTPE	EDELB	FOMB	EREPB	EVMI	ERETB	EGSEU

APPENDIX 3

PROGRAM LISTING -- FSTV

IF NUM_ANAMES=0 THEN DO; /* NO ATTRIBUTES DEFINED */ CALL SVC3 (P); GO TO RTN; END;	ALL00560 ALL00570
/* COPY ATTRIBUTE NAMES FOUND FOR NORMAL PROCESSING */	ALL00580 ALL00590 ALL00500
DO P=RETE RIN. PAR REPEAT RETE RINI. PTR WHILE (P^=NULL); IF RETE RINI. NODE = 4 /* NODE 2 IS ANAME NODE +/	ALL 00620
THEN DO; ANAMES(I)=RETE RINI. CDATA;	ALL00630
GO TO NEXT; /* GET OUT OF P LOOP +/	ALL00640
END;	ALL00650
	ALL00660
1 •/:	ALL00670
CALL SVC3 (TP);	ALL00680
. :/•	ALL00690

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BU100170
BU100180
                    BU100020
                                    BUI00030
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                                                                                                                                  DCL CURSOR (25) PTR CONNECTED; /*CURRENT PTR TO NODES */
DCL PSETID(25) BIT(32) ALIGNED CONNECTED;/*PSETID OF RETN TREE NDS*/
DCL (P.MP.RTP.TP.RP.LP) PTR. (NULL,UNSPEC) BUILTIN, TP1 PTR;
DCL (RNODE,RTN_CODE) FIXED BIN;
DCL (K,NODE) FIXED BIN;
TLD: PROC /* SUBROUTINE USED BY RETN TO BUILD RETURN DATA*/(CURSOR.PSETID.MP.K.LP.RTN_CODE);
                                                        /*MP POINTS TO THE FIRST TOKEN IN RETN TREE, K IS THE OCCUR
NUMBER OF ROOT NODE, LP POINTS TO THE LAST TOKEN IN THE
RETN_RTN LIST UP TO NOW+++/
                                                                                                                                                                                                                                                                                                   /*BEGIN PROCESSING*/
RNODE=MP->REIN_ARG.NODE;/*RNODE CONTAINS ROOT NODE NUMBER*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DO P-REIN_ARG.PTR REPEAT REIN_ARG.PTR WHILE (P^-NULL);
IF REIN_ARG.GET^*REINGET.NG & CURSOR(REIN_ARG.NODE) '
NULL THEN DO; /* DO ONLY IF NECESSARY */
ALLOCATE REIN_RIN1 SET (IP);
LP->REIN_RIN1.PTR=TP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RIN_CODE=1; /**** IS ILLEGAL CURSOR******/
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RIN_CODE=1; /*BAD ID IN CURSOR IREE********/FREE IP->RETN_RIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TP->RETN_RTN1.OLEN=TP1->BEU.OLEN/B;
TP->RETN_RTN1.DATA=TP1->BEU.OATA;
END /*IF GET*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TP->RETN_RTN1.NODE #RETN_ARG.NODE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IP->RETN RIN1.DLEN=IP1->BEU.DLEN/B;
IP->RETN_RIN1.DATA=IP1->BEU.DATA;
                                                                                                                                                                                                                                                                                                                                                                                                  ALLOCATE RETN RTN! SET (TP);
TP->RETN_RTN!_MODE=RETN_ARG.NODE;
TP->RETN_RTN!_INDX=K;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TP1 - CURSOR(RETN ARG. NODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF TP1= NULL THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TP->RETN_RTN1. INDX#1;
                                                                                                                                                                                                                                                              XINCLUDE DBEU, ARETN, ESUB1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LP ->RETN_RTN1.PTR*TP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                           - CURSOR (RNODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IP1=NULL THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /+ALLOCATE THE REST+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    END /+00 P=...+/;
                                                                                                                                                                                                                                                                                                                                                                                   /*ALLOCATE ROOT NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LP=IP:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EZO:
   BUILD PROC
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END /+BUILD+/;

BUI00560

135

FILE: CH

CRT: PROC;

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CRT00040
CRT00050
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CRT00070
CRT00080
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CRT00010
CRT00020
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CRT00230
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                                    *
                               /* A PROCEDURE AT THE MEMORY MGMT LEVEL TO CREATE A SEU
/* FOR INTEGRATED VERSION: MAKE USE OF SUBROUTINES GMEM (GET VIRTUAL
MEMORY) AND PSEU (PUT SEU).
                                                                                                                                                                                                                                                      /+ 5: 3 FOR INVAL & N, 2 FOR SAFETY +/
                                                                                                                                                                                                                                                                                      /* STORE IT */
                                                                                                   %INCLUDE DSEU1,ACRT,SERVICE,FDEBUG,EPSEU.EGMEM;
DCL P PTR, (NULL,UNSPEC) BUILTIN;
DCL (I,RIN_CODE) FIXED BIN, (ID,ID1) BIT(32);
                                                                                                                                                                                       XINCLUDE HEX;
                                                                                                                                                                                                                                                                                                                                        ALLOCATE CRT RTN; CRT_RTN.RTN_CODE=0;
CRT_RTN.ID=ID;
CALL_TRTN (PROC_ADDR,P);
                                                                                                                                                                                                                                                                                         CALL PSEU (101, SEUPTR, RTN_CODE);
                                                                                                                                                                                                                      UNSPEC(SEU.DATA) = CRI_ARG.DATA;
                                                                                                                                                                    CALL TBEG(PROC_ADDR,P);
I=CRT_ARG.N/8;
ALLOCATE SEU;
                                                                                                                                                                                                                                                         CALL GMEM (1+5, ID);
                                                                                                                                                                                                                                                                                                                          /*RETURNS*/
                                                                                                                                                                                                                                                                            101 = 1D;
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RETURN; END/+CRT+/;

CRT00240 CRT00250

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CRT00030
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CALL SRCH (BINFO.PSETID(2), DATA,102, RTN_CODE);
IF RIN_CODE=1 THEN RETURN;/*RTNCODE 1 IS TARGET OF ARC NOT FND*/
                                                                                                                                                                                                                                                                                        IF BINFO.FUNC='S' THEN /*CREATE IT*/
CALL CRIP (BINFO.PSETID(2), DATA, ID2.RTN_CODE);
ELSE DO; /*SEE IF IT ALREADY EXISTS*/
CALL SRCH(BINFO.PSETID(2),DATA.ID2.RTN_CODE);
IF RIN_CODE=1 /*NOT FOUND*/
THEN CALL CRIP(BINFO.PSETID(2),DATA,ID2,RIN_CODE);
                                                                                                   DCL (PARENT, BSETID, ID1, ID2) BIT (32), DATA BIT (+);
DCL RIN_CODE FIXED BIN, MODE CHAR (1), P PTR, NULL BUILTIN;
                                                                                                                                                                                                                                                  WHEN ('N') DO;/* NODE MODE OF CREATION OF BINARY ASSOC*/
CRTB: PROC (PARENT, BSETID, ID1, DATA, MODE, RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  WHEN ('A') DO; /*ARC MODE OF CREATION*/
                                                                                                                                                                   CALL GBCT (BSETID, BINFO, RTN_CODE);
                                          XINCLUDE DBCAT, DBEU;
XINCLUDE EBCT, ESRCH, ECRTP, ESUB1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /*ENTER 1D2 INTO 1D1 1D ARRAY*/
CALL RET1 (1D1,P,RTN_CODE);
BEU. 1D_ARRAY(BINFO.PGS)=1D2;
CALL REP1 (1D1,P,RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /+WHEN 'A'+/:
                                                                                                                                                                                                                                                                                                                                                                                                                                           END /+WHEN N+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /+SLECT+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RTN_CODE #0;
END /+CRTB+/;
                                                                                                                                                                                                             SELECT (MODE);
                                                                                                                                                                                                                                                                                                                                                                                                                    END:
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CRT00150
CRT00160
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                                                                                                                                          DCL (MP.P)PTR,OFF NODE(25) BIT (1) CONNECTED, (RIN_CODE.N) FIXED BIN; DCL DATA BIT (320) VARYING, (SUBSTR,NULL) BUILTIN, (PS.BS.ID) BIT (32), MODE CHAR (1);
                                 /*A S-PROC AT THE N-ARY LEVEL WHICH IS CALLED AS A SUBROUTINE BY THE * UPDN MODULE WHEN ROOT NODE OP IS CRT*/
                                                                                                                                                                                                                                                                    DATA=SÜBSTR(UPDN_ARG.DATA,1,N+8);
PS=UPDN_ARG.PSETID;
CALL_CRIP(PS,DATA,1D,RTN_CODE);
IF RIN_CODE^=0 THEN RETURN; /+0+ IS RIN CODE FROM CRIP*******/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /*FOLLOW THE TREE*/
DO P=UPDN_ARG.PTR REPEAT UPDN_ARG.PTR WHILE (P^*NULL);
IF OFF_NODE(UPDN_ARG.NODE)='O'B THEN DO;
BS=UPDN_ARG.BSETID;
DATA=SUBSTR(UPDN_ARG.DATA, 1.UPDN_ARG.DLEN*8);
SELECT (UPDN_ARG.OP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            END /*SELECT*/;
CALL CRTB(PS,BS,ID,DATA.MODE,RTN_CODE);
END /*DO If*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WHEN (UPDNOP.IST) MODE = 'A'; WHEN (UPDNOP.CI) MODE = 'N';
CRIN: PROC(MP,OFF_NODE,RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          OTHERWISE DO;
                                                                                                      XINCLUDE ECRIB. ECRIP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    END /*DO WHILE*/;
                                                                                                                                                                                                                  /+CREATE ROOT NODE+/
                                                                                                                                                                                                                                                   NªUPDN ARG. DLEN:
                                                                                        XINCLUDE AUPDN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        END / CRTN*/;
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CRT00180
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                                 S-PROC AT THE N-ARY LEVEL TO CREATE A PRIMITIVE ELEMENT WITHIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RTN_CODE=20+RTN_CODE; /+20+ PROBLEM IN REPLACING CHAININIG+/
                                                                                                                                                                                                                 CALL GPCI (PSETID, PINFO, RIN CODE); /*OBTAIN PINFO OF PSETID*/ID1=PINFO.L_ID; /*ID1 POINTS TO THE FIRST ELEMENT */LPOS=PINFO.L_POS; L_POS2=PINFO.L_POS2; I=PINFO.NUMPIR; J*PINFO.NUMPIR; J*PINFO.PLEN*8; /*NO VARIABLE PLEN AVAILABLE IN THIS VERSION*/
                                                                                                                                                                                                                                                                                                                                                                      XINCLUDE EPCT.ESUB1;
DCL (PSETID,ID,ID,ID1) BIT (32), (P,P1) PTR, RTN_CODE FIXED BIN;
DCL (I,J) FIXED BIN, (L_POS,L_POS2) FIXED BIN;
DCL (NULL,UNSPEC) BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IF ID1"=UNSPEC (NULL) THEN DO; /*IF ORIGINAL SET NOT EMPTY*/
                                                                                                                                                                                                                                                                                                                                                                                                                                CALL CRT1 (ID,P.RTN_CODE);
IF RIN_CODE^=0 THEN DD; /+1+ IS PROBLEM IN MM LEVEL*/
RTN_CODE=1+RTN_CODE;
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /*UPDATE BACK POINTER*/
P1->BEU.ID_ARRAY(L_POS2)=ID;
CALL_REP1(ID1,P1,RTN_CODE);
IF_RTN_CODE^=0 THEN_RTN_CODE=10+RTN_CODE;
CRIP: PROC(PSETID, DATA, 10, RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PINFO.L ID-ID;
CALL UPCT (PSETID, PINFO,RTN_CODE);
                                                     * A PSET DESGINATED BY PSETID****/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL RET1(ID1,P1,RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IF PINFO. PTYPE='X' THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     END /+IF ID! NOT NULL+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL REP1(ID, P, RTN CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*FIX UP 'X' TYPE PTYPE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF PI=NULL THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /*UPDATE PCAT ENTRY*/
                                                                                           XINCLUDE DPCAT, DBEU;
                                                                                                                                                                                   DATA BIT (+);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  FREE PI->BEU;
                                                                                                                                                                                                                                                                                                                                                                                                       BEU. DATA = DATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             BEU.DATA=ID;
                                                                                                                                                                                                                                                                                                                                   ALLOCATE BEU;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FREE BEU;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                END:
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FILE: CHIP

RETURN; END /\*CRTP\*/;

CRT00560 CRT00570 CRT00580

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FILE: CRT1

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CRT00080
CRT00090
CRT00100
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CRT00150
CRT00160
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CRT00190
CRT00200
CRT00210
CRT00220
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CRT00130
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                             /+A S-PROC AT THE N-ARY LEVEL FOR COMMUNICATING DIRECTLY WITH THE ** CRT MODULE AT THE MM LEVEL*/
                                                                                                                                                                                                                                                                                                                                                                         %INCLUDE ACRT, DBEU, SERVICE;
DCL ID BIT (32), (P.P1.8P) PTR.(RIN_CODE,I.J.K) FIXED BIN;
DCL (NULL,UNSPEC,STRING,SUBSTR) BUILTIN;
DCL BII_STRING BIT(800) BASED;
                                                                                                                                                                                                                                                                                      CALL TCALL ('CRT', 1,P1,BP);
RTN_CODE=BP->CRT RTN.RTN_CODE;
IF RTN_CODE=O THEN ID=BP->CRT_RTN.ID;
CALL SVG3(P1); CALL SVC3(BP);
                                                                                                                                                                                    /+FILL UP CRT_ARG*/
ALLOCATE CRT_ARG &ET (P1);
P1->CRT_ARG.N=32+NUMPIR*32+DLEN;
P1->CRT_ARG.DATA=P->BIT_STRING;
/*CALL UP CRT*/
CRI1:PROC (ID, P, RIN_CODE);
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RETURN; END; CR100280

FILE: DBA

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DBA00500
DBA00510
DBA00520
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DBA00050
DBA00060
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DBA00370
DBA00380
DBA00390
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DBA00410
DBA00420
DBA00430
DBA00010
DBA00020
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DBA00100
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DBA00280
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('DBA: DATA DEFINITION (DD) OR DATA MANIPULATION (DM) OR DATA DEFINIDBAOO320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DBA00460
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                                DBA00030
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /+SELECT AMONG BASE DATA DEF MODULE AND VIEW DATA DEF+/
PUT SKIP LIST ('DD: BASE DATA (BASE) OR VIEW DATA (VIEW)');
GET EDIT (NAME) (A(25));
IF NAME = (25)' ' THEN LEAVE; /+OUT OF DD MODE+/
                                                                                  /***** PURPOSE: FOR DBA TO SELECT AMONG THE FOLLOWING DBA
**** SUBSYSTEMS: DDB (FOR DEFINING BASE DATA), DDV (FOR
                                                                                                                                                                                       ·
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WHEN ('BASE DATA', BASE') CALL DDB;
WHEN ('VIEW DATA', VIEW') CALL DDV;
OTHERWISE PUT SKIP LIST (NAME,' IS NOT A VALID CMD.');
                                                                                                                                                                                                                                                                                                                                                                                                                              /* BEGIN SESSION */
PUT SKIP(2) LIST ('-- DATABASE ADMINISTRATOR (DBA) SESSION --');
                                                                                                                                    DEFINING VIEW DATA) AND DMB (FOR MANIPULATING
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /+OUT OF DBA SUBSYSTEM+/
                                                                                                                                                                       PRESENTLY THE DDV SUBSYTEM IS NOT AVAILABLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WHEN('DD','DATA DEFINITION')DO WHILE ('1'B);
                                                                                                                                                                                                                       INTER-LEVEL T-PROC: NONE;
INTRA-LEVEL T-PROC: NONE;
INTRA-LEVEL S-PROC: DDB, DMB;
                                                     DESCRIPTION
                                                                                                                                                                                                                                                                                                             CONTROL STRUCTURE SERVICES:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TION QUERY (DDQ)?');
GET EDIT (NAME) (A(25));
IF NAME = (25)' ' THEN LEAVE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               END /*DO WITHIN DD+/;
                                                                                                                                                                                                                                                                                                                                                                              DCL NAME CHAR(25),
TRUE BIT(1) INIT('1'8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /* DATA DEFINITION */
                                                                                                                                                                                                       CALLS PROCEDURES:
                                                                                                                                                        BASE DATA).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SELECT (NAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SELECT COMMAND +/
                                                                                                                                                                                                                                                                             EDDB, EDMB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /* GET COMMAND */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SELECT (NAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WHILE(TRUE);
                                                                                                                                                                                                                                                                             XINCLUDE
     DBA: PROC
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FILE: DBA

/* queries */	DBA00560
	DBA00570
WHEN('DATA MANIPULATION', 'DM') CALL DMB;	DBA00580
	DBA00590
WHEN ('DATA DEFINITION QUERY','DDQ') CALL DDQ;	DBA00600
	DBA00610
/+ INVALID OPERATORS +/	DBA00620
OTHERWISE	DBA00630
PUT SKIP(0) EDIT (NAME, ' IS AN INVALID COMMAND') (A,A);	DBA00640
EMD;	DBA00650
END;	DBA00660
	DBA00670
/* END SESSION */	DBA00680
PUT SKIP(2) LIST (' END OF DBA SESSION');	DBA00690
	DBA00700
/*************************************	DBA00710
DOV: PROC;	DBA00720
PUT SKIP LIST ('DATABASE VIEW DEFINITION NOT AVAILABLE.');	DBA00730
RETURN;	DBA00740
END:	DBA00750
<u> </u>	DBA00760
END /+DBA+/;	DBA00770

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FILE: Und

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DDB00270
DDB00280
               DDB00020
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PUT SKIP LIST ('YOU MAY DEFINE NEW ENTITY SETS OR ADD ATTRIBUTES TO EXIDDBOOSSO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0000000
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                                                                                                                                                                                                                                                                                                    OUTPUT PARAMETERS: AS SHOWN IN DEFE ARG & DEFA ARG, WHICH ARE DATA STRUCTURES FOR COMMUNICATING WITH MODULE DEFE&DEFA.
                                                                                                                                                                                          CMS TO INTERACT WITH THE USER BY DISPLAYING THE PREDESIGNED PANEL FOR USER TO ENTER DATA DEFINITION.
                                                                                                                                                                                                                                 ************************************
                                                                                      DCL 1 TEMP, /*USED AS TEMPORARY STORAGE FOR USER INPUT BEFORE CONV*/
2 MLEN CHAR (2),
                                                                     PURPOSE: THIS MODULE IS THE INTERFACE ROUTINE USED BY THE
                                                                                                                      DBA TO DEFINE THE BASE DATA IN THE ENTITY NETWORK MODEL.
                                                                                                                                                                            THIS MODULE MAKES USE OF THE PANEL MANAGER AVAILABLE ON
                                                                                                                                                                                                                                                                                                                                                                                                                                               **** CONTROL STRUCTURE, PANEL MANAGEMENT & DEBUGGIN SERVICES: */ XINCLUDE SERVICE, FDEBUG, EUDPLI; /******
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DCL ENAME1 CHAR (8);/*USED TO HOLD PARENT ENTITYNAME*/
                                                                                                                                                                                                                                                                                                                                                                                        */ %INCLUDE ADEFE.ADEFA; /* ARGUMENT DCLS****
***** INTRA-LEVEL T-PRDC: NONE;
***** INTRA-LEVEL S-PRDC: NONE;
                                                  DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                             DEFE, DEFA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2 FENCE BIT (32) INIT ((32)'1'8);
DCL RTN CODE FIXED BIN (15);
DCL (P,TP,RP,LP) PTR, RSTATUS BIT (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2 FENCE BIT (32) INIT ((32)'1'B);
                                                                                                                                                                                                                                                                                                                                                                           INTER-LEVEL T-PROC:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 ARG LIST BASED (P).
                                                    MODULE
                                                                                                                                                                                                                                                                                                                                                            CALLS PROCEDURES:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2 LEN FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2 UNLOAD (9) PTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FUNC CHAR (3);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CURSOR FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAX CHAR (6),
MIN CHAR (6),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PNAME CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DCL ADDR BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2 PTR PTR:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DCL CMD CHAR (8):
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NULL BUILTIN:
                                                                                                                                                             METHOD:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 UNLDLIST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1 LOLIST,
DOB : PROC :
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FILE: DOB

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                                                                          PUT SKIP LIST ('NEW ENTITY SET (NEW) OR EXISTING ENTITY SET (OLD)?'); GET EDIT (CMD) (A(B)); If CMD=(B)' ' THEN LEAVE; /* GET OUT OF DATA DEFINITION */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ATTR: DO WHILE ('1'B); /*ATTRIBUTE DEF LOOP */
STRING(TEMP)=REPEAT(' ',100); /*INITIALIZE UNLOAD VAR TO BLANKS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PNAME='PANNOS'; CURSOR=1; LD=ADDR(ENAME1);
PDISPLAY PNAME (PNAME) RSTATUS (RSTATUS) ULDLIST (LDLIST);
IF ENAME1=(8)' 'THEN GO TO RECYCLE_DEFE; /+ GET OUT +/
                                                                                                                                                                                                                                                                 PNAME "'PANNOS'; CURSOR"; LD " ADDR (DEFE ARG.NAME);
PDISPLAY PNAME(PNAME) RSTATUS (RSTATUS) ULDLIST(LDLIST);
IF DEFE ARG.NAME (8) ' '
THEN GO TO RECYCLE DEFE; /*NO MORE NEW ESETS */
                                                                                                                                                                                                                                                                                                                               THEN GO TO RECYCLE_DEFE; /*NO MORE NEW ESETS */
ENAME1=DEFE_ARG.NAME;/*SAVE ENTITY NAME*/
                                     DO WHILE ('1'8); /*LOOP FOR ENTITY SET DEFINITIONS*/
                                                                                                                                                                                                                                                                                                                                                                                                                 CALL TCALL ('DEFE','1,RP,TP);
CALL SVC3 (RP); /*FREE UP CALLING ARGUMENTS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CALL CONFIRM (1,ENAME1);
GO TO ATTR; /* START DEFINE ATTRIBUTE LOOP */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PUT SKIP LIST ('ILLEGAL, PLEASE RE-ENTER');
GO TO RECYCLE_DEFE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL DEFENSG (TP->DEFE RIN.RIN CODE);
CALL SVC3(TP); /*FREE UP RIN MSG*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL SVC3 (TP); /*FREE UP RTN MSG*/
                                                                                                                                                                                                                             ALLOCATE DEFE_ARG;
TP,RP=P; /+SET_TEMP & ROOT PTRS+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                WHEN ('OLD') DO;/+ OLD ENTITY SET +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END; / + ILLEGAL ENTITY SET DEF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF TP -> DEFE_RTN.RTN_CODE -= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GO TO RECYCLE DEFE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*CHECK RETURN CODE*/
                                                                                                                                                                                                                                                                                                                                                                                             /+SET UP DEFE CALL+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            END /* WHEN OLD */:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /* WHEN NEW */:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ALLOCATE DEFA ARG;
STING ENTITY SETS. ');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         END /+ SELECT +/;
                                                                                                                                                                                     WHEN ('NEW') DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GO TO ATTR;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     OTHERWISE DO;
                                                                                                                                            SELECT (CMD);
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                                                           DDB01140
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                                                                                                                                                                                                                                                    IF DEFA_ARG.NAME = (8) ' 'THEN LEAVE; /+NO MORE ATTRIBUTE+/
DEFA_ARG.ENAME1=ENAME1; /+GIVE THE PARENT ENTITY NAME+/
                                                                                                                                                                        PNAME='PANASD'; CURSOR=2;
PDISPLAY PNAME(PNAME) RSIATUS (RSTATUS) ULDLIST (UNLDLIST)
CURSOR (CURSOR);/+ GET DATA FROM PANEL +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL DEFAMSG (-3); /* ILLEGAL NUMERIC RANGE +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DEFA_ARG.VTYPE='N' THEN DO;/+ CHECK MAX, MIN +/
IF VĒRIFY (TEMP.MAX,'0123456789 ') ^= 0 
VERIFY (TEMP.MIN,'0123456789 ') ^= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL DEFAMSG (-4); /* ILLEGAL ATTRIBUTE TYPE */
GO TO RECYCLE DEFA;
END /* OTHERWISE */;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IF DEFA ARG. VTYPE=' ' THEN DEFA ARG. VTYPE='C';
IF VERIFY(DEFA_ARG. VTYPE, 'NC') ** 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF TEMP.MAX=(6)' THEN TEMP.MAX='99999';
IF TEMP.MIN=(6)' THEN TEMP.MIN='-99999';
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEFA_ARG MAX=TEMP.MAX; /* CONVERSION */
                                                                                                                                                                                                                                                                                                                                                                         IF TEMP.MLEN*(2)' ' THEN TEMP.MLEN*'20';
IF VERIFY(TEMP.MLEN,'0123456789') ^= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL DEFAMSG (-2); /+ ILLEGA VTYPE +/
GO TO RECYCLE DEFA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DEFA ARG. MLEN=TEMP. MLEN; / . CONVERSION +/
(1) = ADDR(RP - > DEFE ARG. NAME);
                                                      UNLOAD (4) * ADDR (DEFA ARG.TYPE);
UNLOAD(5) * ADDR (DEFA ARG.ENAME);
UNLOAD (6) * ADDR (TEMP.NLEN);
UNLGAD (1) *ADDR(RP->DEFE_ARG.NAME.);
UNLGAD (2) *ADDR (DEFA_ARG.NAME);
UNLGAD(3) *ADDR (TEMP.FUNC);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     END: /* ILLEGAL VTYPE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                        GO TO RECYCLE DEFA;
END /* ILLEGAL MLEN */;
                                                                                                             UNLOAD(7)=ADDR(DEFA_ARG.VIYPE);
UNLOAD(8) = ADDR (TEMP.MAX);
UNLOAD(9) = ADDR (TEMP.MIN);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GO TO RECYCLE DEFA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEFA_ARG.MIN=TEMP.MIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                       CALL DEFAMSG (-1);
                                                                                                                                                                                                                                                                                                                                    SELECT (DEFA ARG.TYPE);
WHEN ('V') DO:
                                                                                                                                                                                                                                                                                                                     /*PERFORM CONVERSION*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   END /* 'V' */:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHERWISE DO;
                                                                                                                                                                                                                                                                                                                                                                                                                     THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          *HEN ('E');
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DDBO 1650

7

FILE: DOB

END /\* SELECT \*/;

FILE: L.s

DEFANSG: PROC (CODE); DCL CODE FIXED BIN (31); SELECT (CODE).	DDB02210 DDB02220
WHEN (-1) PUT SKIP LIST ('ILLEGAL MAXIMUM LENGTH.');	DDB02240
WHEN (-2) PUT SKIP LIST ('ILLEGAL VALUE TYPE.');	<b>DDB02250</b>
('ILLEGAL	<b>DDB02260</b>
WHEN (-4) PUT SKIP LIST ('ILLEGAL ATTRIBUTE TYPE.');	00802270
WHEN (-5) PUT SKIP LIST ('ILLEGAL FUNCTION TYPE.');	<b>DDB02280</b>
WHEN (5) PUT SKIP LIST ('ILLEGAL ENTITY SET NAME.');	<b>DDB02290</b>
WHEN (1) PUT SKIP LIST ("DUPLICATE ATTRIBUTE NAME.");	DDB02300
WHEN (7) PUT SKIP LIST ('UNKNOWN DOMAIN ENTITY SET NAME');	DDB02310
OTHERWISE;	DDB02320
END /* SELECT */;	DDB02330
PUT SKIP LIST ('ILLEGAL ATTRIBUTE DEFINITION: DEFINITION IGNORED.');	<b>DDB02340</b>
CALL PROMPT;	DDB02350
END /*DEFAMSG */:	DDB02360
	DDB02370
<u>/************************************</u>	
PROMPT: PROC;	DDB02390
PUT SKIP LIST ('PRESS ENTER TO CONTINUE');	<b>DDB02400</b>
GET LIST (CMD);	DDB02410
END:	DDB02420
06730800 /++++++++++++++++++++++++++++++++++	DDB02430
END / ADDR / .	00B02440
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FILE: DDQ

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PUT SKIP LIST ('ATTRIBUTE NAMES? SEPERATE BY COMMAS. USE + IF ALL ATDDQOO400
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                                                                                                                                  ** S-PROC AT THE USER INTERFACE LEVEL, CALLED AS A SUBROUTINE BY THE * DBA MODULE, TO PROCESS DBA'S REQUEST TO QUERY DATA DEFINITIONS. * THIS MODULE MAKES USE OF THE T-PROC AT THE NEXT LEVEL, SHWE, TO ** OBTAIN INFORMATION ABOUT ENTITY SETS AND ATTRIBUTES AND DISPLAYS IT.
                  PUT SKIP LIST ('ENTITY SET NAME? USE . IF ALL ENTITY SET NAMES ARE
                                                                                              <del>/ *********************************</del>
                                                                             CALL LEX (NUM TOKEN, TOKEN, NO BLANKS, RTN CODE); /* CALL LEX TO GET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LINE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /* MEANING ALL */
/* SELECTIVE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PUT SKIP LIST ('-- DATA DEFINITION QUERY SESSION --');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL LEX (NUM TOKEN, TOKEN, NO BLANKS, RTN CODE);
IF NUM TOKEN=0 THEN LEAVE; 7+ GET OUT */
ENAME = TOKEN.D(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    = ' *' THEN GO TO SEND; / * WANT ALL */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /+GET 0UT+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /* YEF */
                                                                                                                                                                                                                                                                                                                                                       1 TOKEN(25), /* USED TO COMM. WITH LEX +/
                                                       DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PUT SKIP LIST ('ILLEGAL SYNTAX');
GO TO LOOP; /* TRY AGAINS */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SHWE_ARG.NUM_NAME2=NUM_TOKEN;
DO I = 1 TO NUM_TOKEN;
                                                                                                                                                                                                                                                                                                                                                                                                                 DCL NO BLANKS FIXED BIN INIT (1);
DGL FUNC1 CHAR (3);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SUBSTR(TOKEN.D(1), 1, 1)='+'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  THEN SHWE ARG. NUM NAME2=999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF NUM_TOKEN=O THEN LEAVE;
                                                                                                                                                                                                                                                                              XINCLUDE ASHWE, SERVICE, ELEX;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF RTN CODE ^* O THEN DO:
                                                                                                                                                                                                                                                                                                                  DCL(NUM_TOKEN,I) FIXED BIN;
DCL RIN_CODE FIXED BIN;
                                                         MODULE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ALLOCATE SHWE_ARG;
SHWE_ARG.NAMET=ENAME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                         DCL NULL BUILTIN, P PTR;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TRIBUTES ARE DESIRED');
                                                                                                                                                                                                                                                                                                 DCL ENAME CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                              L FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                             2 D CHAR (40)
                                                                                                                   PURPOSE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DO WHILE ('1'B);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF ENAME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /+ BEGIN +/
DDO: PROC:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ESIRED. ');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LOOP
```

0000000 DD000580 0000000 00900000 0000000 00000620 0000000 00000640 0000000 09900000 0000000 00000000 06900000 0000000 **DD000710** 00000120 **DD000730** 00000740 00000150 0000000 07700000 **DDQ00780** 00000000 **DDQ00810** DD000820 0000000 **DDQ00840** 0000000 DDQ00860 0000000 08600000 06800000

•

/\*ERROR RETURN FROM SHWE

PUT LIST ('\*\*\* DDQ TO CALL TCALL SHWE'); CALL TCALL ('SHWE', 1, SHWE\_ARG\_P, SHWE\_RTN\_P); CALL SVC3 (SHWE\_ARG\_P);

/\* EXAMINE RETURN CODE \*/ I = SHWE\_RIN.RIN\_CODE; IF I >=0 THEN DO;

FILE: DOG

SHWE\_ARG.NAME2(1) = TOKEN.D(1);

END:

```
CALL SHWEMSG (I);
CALL SVC3 (SHWE_RTN_P);
GO TO END; /* TRY AGAIN */
                                                                                          IF
```

```
P=SIME RIN P: /* SAVE IT */
SHWE RIN P=SHWE RIN.PIR; /* ->SHWE RIN2 */
PUT SKIP LIST ('NUMBER OF ENTITY SETS DEFINED', NUM ENAME);
DO I = 1 TO NUM ENAME;
IF MOD(I,8)= 1 THEN PUT SKIP EDIT (SHWE RIN2.ENAME(I))(A(8));
ELSE PUT EDIT (SHWE_RIN2.ENAME(I)) (COL((I-1)*9+1),A(8));
                                                                                                                                                                                                                                                                                 CALL SVC3 (P);
END /* IF ENAME = * */;
ENAME = . + . THEN DO
```

0000000

```
VTYPE
                                                                                 MAX LEN MAX VALUE MIN VALUE') (A);
P=SHWE RTN P; /* SAVE IT */
DO SHWE RTN P = SHWE RTN.PTR REPEAT SHWE RTN1.PTR WHILE
(SHWE RTN P ^* NULL);
IF TYPE ^* 'E' THEN ENAME = (8)' '; ELSE VTYPE = '';
                                                         ENAME
                          PUT SKIP LIST ('ENTITY SET NAME', ENAME);
PUT SKIP EDIT ('ATTRIBUTE NAME FUNCTION TYPE
ELSE DO;
```

00600000 01600000

0000000 0000000 DDQ00940 0000000 09600000 07600000 08600000 06600000 00010000 01010000 00001020 00001040 DD001050 **DD001060** 00001000

```
END /* SELECT */;
PUT SKIP EDIT (ANAME, FUNC1, TYPE, SHWE_RTN1.DATA.ENAME, (X(6), A(8), X(7), A(3),
X(5), A(1), X(2), A(8), X(6), A(1));
If TYPE = 'V' THEN DO;
PUT EDIT (MLEN) (COL(52), F(5));
                    WHEN ('S') FUNC1='1:1';
WHEN ('K') FUNC1='KEY';
                                                                WHEN ('M') FUNC1='M:1';
SELECT (FUNC);
                                                                                          OTHERWISE:
                                                                                                                                                                 VTYPE)
```

```
THEN PUT EDIT (MAX, MIN) (COL(62), F(6), X(5), F(6));
IF VTYPE = 'N'
```

00001030

00001000 00011000

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END /* 00 P */;
                          END / ELSE +/;
                CALL SVC3 (P);
```

FILE: DOQ

Ž
VM/SP

END: /* DO WHILE */	DDQ01110 DDQ01120
:	DD001140
DCL CODE FIXED BIN:	DD001160
	00001170
IF CODE < 0	00001180
THEN DO:	00001150
SELECT (CODE);	DDQ01200
WHEN (-1) PUT SKIP LIST ('ILLEGAL ENTITY NAME');	00001210
WHEN (-2) PUT SKIP LIST ('NO ENTITY SETS DEFINED.');	DDQ01220
WHEN (-3) PUT SKIP EDIT ('NO ATTRIBUTES DEFINED FOR ENTITY SET',	00001230
ENAME)(A,A);	DDQ01240
OTHERWISE:	DDQ01250
END /*SELECT */;	DDQ01260
END /* CODE < O */;	DDQ01270
	DDQ01280
ELSE IF CODE <= NUM TOKEN	DDQ01290
THEN PUT SKIP LIST	DD001300
('ILLEGAL ATTRIBUTE NAME', TOKEN.D(I));	00001310
	DDQ01320
PUT SKIP LIST ('ILLEGAL DD QUERY STATEMENT');	00001330
PUT SKIP LIST ('PLEASE RE-ENTER');	DD001340
END /* SHWEMSG +/;	DDQ01350
/+*************************************	00001360
	DDQ01370
END /* DDQ */;	DD001380

DEFA: PROC

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CALL GACT (ANAME, ENAME, AINFO, RTN_CODE);
IF RIN_CODE^*2 THEN DO; /*2 FROM GACT IS NO SUCH ATTRIBUTE***/
RTP->DEFA_RTN.RTN_CODE*1; /***1 IS DUPLICATE ATTRIBUTE NAME***/
CALL TRIN (PROC_ADOR, RIP); /*RETURNS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RIP->DEFA RIN.RIN CODE=5; /+++5 IS PROBLEM WITH PARENT ENTITY+++/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            'V', RIN_CODE, PSETID2);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WHEN (2) DO ; /*MEANS TARGET ENTITY SET DOES NOT EXIST YET*/
/* IN THIS VERSION THIS MEANS AN ERROR; FUTURE VERSIONS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /*IF FDEBUG.LEV! THEN PUT SKIP LIST ('DEFA: CREATING V PSET'); CALL DFP1 ('N',4,'V',RIN_CODE, PSETID2);
                     / * A T-PROC AT THE ENTITY LEVEL FOR DEFINING ATTRIBUTES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ELSE DO: /*ENTITY TYPE, CHECK TO SEE IF EXISTS ALREADY**/
                                                                                                                                                           DCL (F.MP.TP.RP.RTP.LP) PTR, NULL BUILTIN;
DCL (ENAME, ANAME) CHAR (8), RTN CODE FIXED BIN;
DCL (PSETID1, PSETID2, BSETID) BIT (32);
DCL BIT_STRING BIT (232) BASED; /*AINFO IS 19 BYTES LONG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF AINFO.TYPE='V' THEN DO; /*MUST CREATE TARGET PSET*/
IF AINFO VIYPE='N' THEN DO;/*NUMERIC*/
                                                                   %INCLUDE ADEFA, ARETE, AUPDE, SERVICE, FDEBUG,ADEFE;
%INCLUDE DECAT; /*CATALOGUE TEMPLATES*/
                                                                                                                                                                                                                                                                                                                                                                                                                      AINFO=MP->DEFA_ARG, BY NAME;
ENAME=MP->DEFA_ARG.ENAME1; /*PARENT ENTITY NAME+/
ANAME=MP->DEFA_ARG.NAME; /*ATTRIBUTE NAME+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A: CALL GECT (AINFO.ENAME, EINFO, RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ELSE CALL DFP1 (AINFO.VTYPE, AINFO.MLEN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL GECT (ENAME, EINFO, RIN CODE);
                                                                                                                                                                                                                                                         ENCODED STRING+/
                                                                                                               XINCLUDE EGACT, EGECT, EDFP1, EDFB1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CALL TRIN(PROC ADOR, RIP);
                                                                                                                                                                                                                                                                                DCL (STRING, UNSPEC) BUILTIN;
                                                                                                                                                                                                                                                                                                                                                    CALL TBEG (PROC_ADOR, MP);
ALLOCATE DEFA_RTN SET (RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /+CHECK PARENT ENTITY SET+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /+HANDLING TARGET PSET++/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IF RIN CODE" = O THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETURN: /+RETÜRNS+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SELECT (RIN CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PSETID1=EINFO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RETURN:
                                                                                                                                                                                                                                                                                                                                /*BEGIN*/
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WILL OPTIONALLY DEFINES THE TARGET ENTITY SET */
RTP->DEFA_RTN.RTN_CODE*7; /*** 7 IS UNKNOWN TARGET ESET *****/
CALL TRIN (PROC_AGOR, RTP);
                                                                                                                                                               RTP--DEFA RTN. RTN CODE = 3; /+3 IS PROBLEM IN TARGET ESET+/
CALL TRIN(PROC_ADOR, RTP);
RETURN;
                                                                                                                                                                                                                                                                                                                        /*IF FDEBUG.LEV1 THEN PUT SKIP LIST ('DEFA: CREATING BSET'); */
CALL DFB1 (AINFO.FUNC, PSETID1, PSETID2, RIN_CODE, BSETID);
                                                                                                                                                                                                                                                                                                                                                                                                                                         /*ASET NODE */
                                                                                                                                                        OTHERWISE DO; /*ILLEGA TARGET ESET*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALLOCATE UPDE_ARG; /*ANAME NODE*/
LP->UPDE_ARG.PTR=P; LP=P;
UPDE_ARG.NAME="A*ANAME";
UPDE_ARG.OP=UPDEOP.IST;
UPDE_ARG.OPENT=1;
UPDE_ARG.OLEN-B;
UPDE_ARG.CDATA=ANAME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ALLOCATE UPDE ARG: / +ENAME NODE +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALLOCATE UPDE_ARG; /*ESET NODE*/
LP->UPDE_ARG.PTR*P; LP*P;
                                                                                                                                                                                                                                                        END /*SELECT*/;
END /*ELSE DO ENTITY TYPE*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                         ALLOCATE UPDE_ARG; RP,LP*P;
UPDE_ARG.NAME"/E+ASET ';
UPDE_ARG.OP=UPDEOP.CRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LP->UPDE ARG. PTR=P; LP=P;
UPDE ARG. NAME * 'A * ENAME ';
UPDE ARG. OP = UPDE OP . ID;
UPDE ARG. PARENT = 2;
UPDE ARG. DLEN=B;
UPDE ARG. CDATA * ENAME;
UPDE ARG. NODE = 3;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UPDE ARG NAME " A * ESET ';
UPDE ARG OP = UPDEOP . IST;
UPDE ARG . PARENT = 1;
UPDE ARG . NODE = 2;
                                                                                                      /+CO1 11+/
                                                                      END /* WHEN 2+/;
                                                                                                                                                                                                                                                                                                                                                                                           AINFO. PSETID=PSETID2:
                                                                                                                     PSETID2-EINFO;
                                                                                                                                                                                                                                                                                                                                                                           AINFO. BSETID=BSETID;
                                                                                                                                                                                                                                                                                                                                                                                                                            /+GIVE IT TO UPDE++/
                                                                                                                                                                                                                                                                                                         *CREATE BSET */
                                                      RETURN:
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PL 10PT

FILE: LLIA

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IF TP->UPDE RIN.RIN_CODE^=0 THEN
RIP->DEFA_RIN.RIN_CODE=6; /**6 IS PROBLEM INUPDATING ENTITY CAT.+/
ALLOCATE UPDE ARG; /*AINFO NODE*/
LP->UPDE ARG.MAME*'A*AINFO ';
UPDE ARG.NODE * 5;
UPDE ARG.NODE * 5;
UPDE ARG.NODE * 5;
UPDE ARG.PARENT*!;
UPDE ARG.PARENT*!;
UPDE ARG.PARENT*!;
UPDE ARG.CODE * 5;
UPDE ARG.COARA)=ADDR(AINFO)->BIT_STRING;
                                                                                                                                                                                                                                                                    /*RETURNS*/
CALL SVC3 (RP);
CALL SVC3 (TP);
CALL TRIN( PROC_ADOR, RTP);
RETURN;
END /*DEFA*/;
                                                                                                                                                                    CALL TCALL ('UPDE', 1, RP. TP);
                                                                                                                                                       / +CALL UP UPDE +/
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FILE: DEFB

DEFB: PROC

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                  /** A T-PROC AT THE N-ARY LEVEL FOR DEFINING BINARY ASSOCIATION SET*/
                                                                                                           DCL MAP BIT (32), (P,MP,RTP,TP)PTR, (MULL,UNSPEC,STRING,ADDR) BUILTIN; DCL (POS,RTN CODE) FIXED BIN; DCL 1 BIT STRING BIT (88) BASED; /*BIT TEMPLATE OF BINFO*/ DCL 1D BIT (32);
                                                                                                                                                                                                                                                                                                                                                                     MAP-PINFO.MAP;
CALL MPST (MAP, POS);
IF POS=O THEN DO;
RTP->DEFB RTN.RIN_CODE=1; /**1 IS ID ARRAY OVERFLOW****/
CALL TRIN(PROC_ADOR,RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL CRIP(BCATID, ADDR(BINFO) -> BIT_STRING, ID, RIN_CODE);
IF RIN_CODE^*O THEN
RIP-> DEFB_RIN.RIN_CODE*1+RIN_CODE; /*1+ IS FROM CRIP****/
ELSE_RIP-> DEFB_RIN.BSETID*ID;
                                                                                                                                                                                                                                                                                                                                                       CALL GPCT(BINFO.PSETID(1), PINFO,RTN_CODE); /+OBTAIN CAT ENTRY+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /*UPDATE PSETCAT ENTRY TO REFLECT USAGE OF PTR IN ID_ARRAY*/
                                                                                                                                                                                                                 /*BEGIN PROCESSING*/
CALL TBEG (PROC_ADDR, MP);
ALLOCATE DEFB_RIN SET (RTP); RTP->DEFB_RIN.RIN_CODE*O;
                                                        %INCLUDE SERVICE, ADEFB, DPCAT, DBEU, DNKEY, DBCAT;
%INCLUDE EPCT, EMPST, ECRTP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL UPCT (BINFO. PSETID(1), PINFO, RTN_CODE);
                                                                                                                                                                                                                                                                                                                                      **ASSIGN ID ARRAY IN PSETID(1)*/
                                                                                                                                                                                                                                                                                                 BINFO * MP - > DEFB ARG, BY NAME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CALL TRIN (PROC_ADDR, RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PINFO.MAP=MAP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        BINFO. POS=POS;
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FILE: DEFE

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /*** CONTROL STRUCTURE, PANEL MANAGER AND DEBUGGING FACILITIES: */
%INCLUDE SERVICE,FDEBUG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                           <del>/ ****************************</del>
                                                                   THEN DUPLICATED ESET NAME IS DETECTED AND THE CALLER
                                                                                                     PURPOSE: THIS ROUTINE ENABLES DEFINITION OF AN ENTITY SET; IT IS PAIRED WITH MODULE DEFA TO COMPLETE DO OF THE
                                                                                                                                                                               1, CALLS UPDE TO INSERT THE ENTITY IF ERROR RETURN.
                                                                                                                                                                                                                                                       CALLS DEFP (THROUGH SBR DFP1) TO DEFINE A PSET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ALLOCATE DEFE_RIN SET (RTP);
RTP->DEFE_RIN.RIN_CODE=0; /*INITIALIZE RIN CODE TO O.K.*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DEFP (THROUGH SBR DFP1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL GECT (NAME.EINFO,RTN_CODE);
IF RTN_CODE ^* 2 THEN DO;/*NAME ALREAY EXISTS*****/
RTP-> DEFE_RTN.RTN_CODE * 1; /*ILLEGAL DEFE*/
                                                                                                                                                                                                                                                                       CORRESPONDING TO THIS ENTITY SET;
CALLS UPDE AGAIN TO INSERT THE PSETID
INTO 'ESET' ENTITY SET;
                                                                                                                                                                                                                                                                                                                                                                INPUT PARAMETERS: AS INDICATED BY DEFE_ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                    OUTPUT PARAMETERS: AS INDICATED BY DEFE RTN;
                                                                                                                                              ENTITY NETWORK IN THE BASE DATABASE.
                                                                                                                                                                                                                                                                                                                              SET UP RETURN MSG FOR CALLER;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /+CHECK IF NAME DUPLICATED BY CALLING GECT+/
                                                    DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /**** INTRA-LEVEL S-PROC: DFP1, GECT
%INCLUDE EDFP1, EGECT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NAME CHAR (8), PSETID BIT(32);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 INTER-LEVEL T-PROC: DEI INTRA-LEVEL T-PROC: UPDE
                                                     MODULE
                                                                                                                                                                                                                                      SO ADVISED;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DCL (P.TP.RP, TP1,RTP)PTR;
DCL RTN CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALLS PROCEDURES:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              **** CALLING ARG LIST :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL TBEG (PROC ADDR,P);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NAME = P - > DEFE_ARG. NAME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /*ALLOCAT DEFE RTN*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DCL NULL BUILTIN;
DCL EINFO BIT (32);
                                                                                                                                                                                   METHOD:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      XINCLUDE AUPDE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              XINCLUDE ADEFE;
DEFE: PROC:
                                                                                                           ****
                                                                                                                                                                                   ****
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ****/
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FILE: DEFE

**DEF00020** DEF00030 **DEF00040 DEF00050 DEF00060 DEF00070 DEF00080 DEF00090 DEF00100 DEF00110 DEF00120 DEF00130 DEF00140 DEFO0150 DEF00160 DEF00176 DEF00180 DEFO0190** 

DEFP PROC;

/+T-PROC AT THE N-ARY LEVEL FOR DEFINING PRIMITIVE SETS+/

```
PINFO=AP->DEFP_ARG, BY NAME; /*COPY INFO FROM DEFP_ARG TO PINFO*/
IF PINFO.PTYPE="X" THEN PINFO.PLEN=4; /*FIX UP 'X' TYPE="/
PINFO.NUMPTR=AP->DEFP_ARG.IMP.NUMPTR;
PINFO.LTYPE=PINFOLTYPE.LL;/*ONLY LINK LIST IS AVAILABLE IN THIS VER+/
PINFO.L_ID=UNSPEC(NULL());
```

DEF00200 DEF00210

**DEF00220 DEF00230 DEF00240 DEF00250 DEF00260 DEF00270 DEF00280 DEF00290 DEF00300 DEF00310 DEF00320 DEF00330 DEF00340 DEF00350 DEF00360 DEF00370 DEF00380 DEF00390 DEF00400** 

DO I=PINFO.NUMPTR+1 TG 32; /\*INIT MAP\*/ CALL MPST(MAP,POS);

CALL MPST(MAP, POS); /\*FIND BACKWARD LINK POS\*/ CALL MPST(MAP,POS); /\*FIND FORWARD LINK POS\*/ PINFO.L POS2=POS; PINFO.MAP=MAP; PINFO.L\_POS=POS; END:

CALL CRIP(PCATID, ADDR(PINFO)->BIT\_STRING, ID, RTN\_CODE);
IF RIN\_CODE^=O THEN RTP->DEFP\_RIN\_RIN\_CODE=RIN\_CODE;
ELSE RIP->DEFP\_RIN.PSETID=ID;

CALL TRIN(PROC\_ADOR, RTP); END /\*DEFP\*/; RE TURN:

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FILE: DEL

JEL : PROC:	DEL00010
	DEL00020
/+T-PROC AT THE MM LEVEL FOR DELETING A SEU FROM SH++++/	DEL00030
/* WILL SET INVAL AT 10+/	DEL00040
/+ FOR INTEGRATED VERSION: MAKE USE OF SUBROUTINES PSEU, GSEU +/	DEL00050
	DE1.00060
KINCLUDE ADEL DSEU1.SERVICE.EGSEU.EPSEU:	DEL00070
OCL (P.RTP) PTR. (NULL.UNSPEC) BUILTIN, RTN CODE FIXED BIN;	DE1.00080
	DE1.00090
CALL TREG (PROC ADDR.P):	DEL00100
LILOCATE DEL RIN SET (RTP); RTP->DEL RIN.RIN CODE=O;	DEL00110
ALL GSEU(DEL ARG. ID. SEUPTR, RTN CODE): /* GET SEU TO BE DELETED */	DEL00120
IF RIN CODE = 1	DEL00130
THEN RIP ->DEL RIN RIN CODE=1;	DEL00140
ELSE DO:	DEL00150
SEU. INVAL = 'V':	DEL00160
CALL PSEU (DEL ARG.ID. SEUPTR. RTN CODE); /* SET SEU INVAL FLAG +/	DEL00170
END.	DEL00180
	DEL00190
	DEL00200
CALL TRIN(PROC ADDR. RTP):	DEL00210
RETURN:	DEL00220
END /*DET*/:	DE1.00230

FILE: DELB

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DELOO 100
DELOO 110
DELOO 120
DELOO 130
DELOO 140
                                                                                                                                                                                                                                                                  DELOO150
DELOO160
DELOO170
DELOO180
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DELO0240
DELO0240
DELO0250
DELO0250
DELO0290
DELO0300
DELO0300
DELO0300
DELO0300
DELO0300
DELO0330
                                                       DEL00040
DEL00050
DEL00010
                   DELOCO20
                                     DE1.00030
                                                                                              DEL00060
                                                                                                                 DEL00070
                                                                                                                                   DEL00080
                                                                                                                                                     DEL00090
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                                                                                                                                                                                                                                                                                                                                                                DEL00200
                                                                                                                                                                                                                                                                                                                                                                                  */DEL00210
                                                                                                                                                                                                                                                                                                                                                                                                    DEL.00220
                                                                                                                                                                                                                                                                                                                                                              ID2=BEU.ID_ARRAY(BINFO.POS);
IF ID2 ^= UNSPEC (NULL) THEN DO; /* IF THERE EXISTS A BIN ASSOC ELEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 OTHERWISE;
END /*SELECT*/;
IF RIN_CODE ^* O THEN RIN_CODE = 20 + RIN_CODE; /* 20 + IS RINCODE
FROM DELP ****************/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               WHEN ('N') /*NODE MODE DELETES TARGET NODE TOO*/
IF BINFO.FUNC='S' THEN CALL DELP(BINFO.PSETID(2),ID2,RIN_CODE);
                                                       /*A S-PROC AT THE N-ARY LEVEL TO DELETE A BINARY ASSOCIATION*/
                                                                                                                                                  DCL (PARENT.BSETID, ID1, ID2) BIT (32), P PTR, MODE CHAR (1); DCL (NULL, UNSPEC) BUILTIN; DCL RTN_CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                    BEU.IO_ARRAY(BINFO.POS)=UNSPEC (NULL); /*DELETE ARC*/
                                                                                                                                                                                                                            CALL GBCT (BSETID, BINFO, RTN_CODE);
IF RTN_CODE ~= O THEN RETURN; /* O+ IS FROM GBCT */
CALL RET1 (ID1, P, RTN_CODE);
IF P=NULL THEN DO;
RTN_CODE=10; /***10 IS BAD SOURCE ELEM ********/
RETURN; END;
                   DELB: PROC (PARENT, BSETID, ID1, MODE, RTN_CODE);
                                                                                            XINCLUDE DBEU, DBCAT;
XINCLUDE EBCT, ESUB1, EDELP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                             SELECT (MODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RETURN;
END /*DELB*/;
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DEL 00020 DE100030 **DEL.00040** DE100050 **DEL00140** DEL00150 DE1.00160

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DEL00340
DEL00350
DEL00360
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DEL00070
DEL00080
DEL00090
DEL00100
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DELOO120
DELOO130
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DEL00200
DEL00210
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DEL00330
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL DELP (PS,ID,RIN_CODE);
IF RIN_CODE ^* O THEN RIN_CODE * 50 + RIN_CODE; /* 50+ FROM DELP ***/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IF RIN CODE ^* O THEN RETURN; /* RIN_CODE SET TO RIN FROM SBR CALLS */
                                                                                                                                                                   DCL (MP.P) PTR, (N.RTN_CODE) FIXED BIN,
OFF_NODE(25) BIT (1) CONNECTED,
DATA BIT (320) VARYING, (PS,ID,BS) BIT (32), (SUBSTR,NULL)BUILTIN;
                                      /*A S-PROC AT THE N-ARY LEVEL USED AS A SUBROUTINE CALLED BY THE *UPDN PROGRAM TO PERFORM DEE OP AT ROOT NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  WHEN (UPDNOP.DEL) CALL DELB (PS.BS.1D, 'A', RTN_CODE); WHEN (UPDNOP.DD) CALL DELB (PS.BS.1D, 'N', RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                 /*FOLLOW THE TREE*/
DO P=UPDN_ARG.PTR WHILE (P^=NULL);
IF OFF NODE(UPON_ARG.NODE)*'O'B THEN DO;
BS=UPDN_ARG.BSETID;
                                                                                                                                                                                                                                                         /*DO P*MP REPEAT UPDN_ARG.PTR WHILE(P^**NULL);
PUT SKIP LIST('DELN ARG LIST', UPDN_ARG); END;
                                                                                                                                                                                                                                                                                                                                                                PS=UPDN_ARG.PSETID;
DATA=SUBSTR(UPDN_ARG.DATA,1,UPDN_ARG.DLEN * B);
CALL_SRCH(PS,DATA,1D.RTN_CODE);
DELN: PROC(MP.OFF_NODE,RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /* NOW DELETE THE ROOT NODE */
                                                                                                      XINCLUDE AUPDN;
XINCLUDE EDELB.ESRCH.EDELP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SELECT (UPDN_ARG. OP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               END /*SELECT*/;
END /*DO 1F*/;
END /*DO P LOOP */;
                                                                                                                                                                                                                                                                                                                                              /+LOCATE ROOT NODE 1D+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /*DELN*/
```

DE1.00220 DEL00230 **DEL00240** 

DELP: PROC (PSETID, ID, RTN\_CODE);

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DEL00090
DEL00100
DEL00110
DEL00120
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DEL00280
DEL00290
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DEL00160
DEL00170
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DEL00330
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DEL00400
 DEC00030
                    DEL00040
                                       DE1.00050
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                                                                                                                                                                                                                                                                                                                   PREV_ID*BEU.ID_ARRAY(PINFO.L_POS2); /*REMEMBER NEIGHBORS IN CHAIN*/
POST_ID*BEU.ID_ARRAY(PINFO.L_POS);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ELSE DO: /* IF PREV ID IS NULL THEN ELEM BEING DELETED IS FIRST IN PSET CHAIN, THEREFORE NEEDS TO UPDATE PCAT ENTRY */
PINFO.L ID * POST_ID;
CALL UPGT (PSETID,PINFO.RTN_CODE);
/* A S-PROC AT THE N-ARY LEVEL WHICH DELETES A P ELEMENT GIVEN ITS
                                                                                                                                                                                CALL GPCT (PSETID, PINFO, RTN_CODE); /*FIRST OBTAINS PSET CAT*/
                                                                                                                                                                                                                        CALL RET! (10,P,RTN_CODE); /+OBTAIN ELEM TO BE DELETED+/
                                                                                                                       DCL (PSETID, ID) BIT (32), RTN CODE FIXED BIN, P PTR;
DCL (NULL, UNSPEC) BUILTIN, (PREV_ID, POST_ID) BIT (32);
                                                                                                                                                                                                                                                                RTN_CODE=1; /+BAD ELEM, MIGHT ALREADY BEEN DELETED+/
                                                                                                                                                                                                                                                                                                                                                                                     CALL DEL1(ID,RTN_CODE); /*DELETE IT+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                  **MODIFY PTR CHAIN WITHIN THE PSET*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF PREV ID ~= UNSPEC(MULL) THEN DO;
CALL RET; (PREV ID,P,RTN CODE);
BEU ID ARRAY(PINFO.L_POS)=POST_ID;
CALL REP; (PREV_ID,P,RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF POST ID ~= UNSPEC(NULL) THEN DO;
CALL RETI(POST ID, P.RTN_CODE);
BEU.ID_ARRAY(PINFO.L_POS2)=PREV_ID;
CALL_REPI (POST_ID, P.RTN_CODE);
                    . ID WITHIN A PSETID+/
                                                            XINCLUDE DPCAT, DBEU;
                                                                             XINCLUDE EPCT, ESUB1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RTN_CODE =0; RETURN;
END /+DELP+/;
                                                                                                                                                                                                                                              IF P-NULL THEN DO;
                                                                                                                                                                                                                                                                                      RETURN: END:
                                                                                                                                                                                                                                                                                                                                                                                                          FREE BEU;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FREE BEU;
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PL 10PT

FILE: DEL 1

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DUMOCO 40
DUMOCO 50
DUMOCO 60
DUMOCO 70
DUMOCO 80
DUMOCO 80
DUMOCO 90
DUMOCO 90
                                                                                                                                                   DUMOO 1 10
DUMOO 1 20
DUMOO 1 30
DUMOO 1 40
DUMOO 1 50
DUMOO 1 60
                                                                                                                                                                                                                                                        DUMOO 180
DUMOO 190
DUMOO 200
DUMOO 210
DUMOO 220
                                 DUM00030
                                                                                                                                                                               /***/
                                                                                                                                                                                                                         /*A S-PROC AT THE LOWEST LAYER OF N-ARY LEVEL TO SET UP CALL TO . DEL MODULE AT THE MM LEVEL TO DELETE BEU DESIGNATED BY 1D*/
                                                                        XINCLUDE SERVICE,ADEL,FDEBUG;
DCL (P.TP) PTR, NULL BUILTIN, RTN_CODE FIXED BIN, ID BIT (32);
                                                                                                                                                                                                                                                        RTN_CODE * TP - > DEL_RTN. RTN_CODE;
                                                                                                                  ALLOCATE DEL_ARG;
DEL_ARG.ID*ID;
CALE TCALL ('DEL', 1,P,TP);
DEL1: PROC (ID,RTN_CODE);
                                                                                                                                                                                                                                                                   CALL SVC3(P);
CALL SVC3(TP);
RETURN;
END /*DEL1*/;
```

DFB00010 10 DEFB*/ DFB00020 DFB00030	DFB00040 DFB00050	DF800060 DF800070	DFB00080	DF800100	DFB00110	DFB00120	DFB00130	DFB00140	DFB00150	DF800160	DFB00170	DF800180	DFB00190	DFB00200	DFB00210	DFB00220	DEROOSSO
DFB1:PROC(FUNC, PSETID1,PSETID2,RTN_CODE,BSETID); /*A S-PROC AT THE ENTITY LEVEL FOR SETTING UP CALLS TO DEFB*/	%INCLUDE SERVICE,ADEFB,FDEBUG;	DCL NULL BUILTIN, (P.TP)PTR; DCL FUNC CHAR (1).(PSETID1.PSETID2)BIT(32);	DCL RIN_CODE FIXED BIN, BSETID BIT(32);	ALLOCATE DEFB ARG:	DEFB_ARG. PSETID(1) *PSETID1;	DEFB_ARG.PSETID(2)=PSETID2;	DEFB_ARG. FUNC*FUNC;	IF FUNC='K' THEN DEFB_ARG.FUNC='S';	ı	CALL TCALL ('DEFB', 1, P, TP);	RIN_CODE=TP->DEFB_RIN.RIN_CODE;	F RTN CODE *O THEN BSETID=TP->DEFB RTN.BSETID;		CALL SVC3 (P);	CALL SVC3 (TP);	RETURN;	END /+DFB1+/:

```
DFP00270
DFP00010
                  DF P00020
                                    JF P00030
                                                   DFP00040
                                                                    DFP00050
                                                                                       DFP00060
                                                                                                         DFP00070
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IF DEFP_RTN.RTN_CODE - O THEN DO;
PUT SKIP_LIST ('DFP1: DEFP RIN CODE NOT O, IS', DEFP_RIN.RIN_CODE);
                                                                                                                                                                                                                                                                                                                                          *
                                                                                                                                                                                                                                                                                                                                                                                                        ***** CONTROL STRUCTURE, PANEL MANAGER AND DEBUGGING FACILITIES: */
                                                                                                                                                                                                                                                    ******
                                                                                                                                                                                                                                                                                                          IMPP:PROC; /+INTERNAL SUBROUTINE FOR ASSIGNING IMP PORTION OF DEFP+/
                                                                                                                                                       INPUT PARAMETERS: PTYPE, CHAR(1), IS THE DATA TYPE OF THE PSET TO BE DEFINED; PLEN, FIXED BIN, IS THE LENGTH; TYPE, CHAR(1), INDICATES 'E' OR'V', TO BE USED BY THE INTERNAL ROUTINE IMPP FOR DETERMINING IMP PORTION OF
                                                                                                         PURPOSE: THIS IS THE SUBROUTINE USED AT THE ENTITY LEVEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL IMPP; /*IMPP COMPLETES THE IMP PORTION OF DEFP ARG*/
                                                                                                                                                                                                                                                                                      RIN_CODE AND PSETID AS OBTAINED FROM DEFP CALL;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RTN_CODE FIXED BIN;
PTYPE CHAR(1), PLEN FIXED BIN, TYPE CHAR(1);
 DFP1:PROC ( PTYPE,PLEN,TYPE,RTN_CODE,PSETID);
                                                                                                                           TO SET UP CALL TO DEFINE ONE PSET.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL SVC3(RP); /+FREE CALLING ARG LIST+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PSETID*TP->DEFP_RTN.PSETID;
CALL SVC3 (TP); /+FREE UP RTN MSG LIST+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RP*P; /*R00T PTR*/
                                                       DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                NON
                                                                                                                                                                                                                                                                                                                                                                                                 NON
                                                                                                                                                                                                                                                                                                                                          INTER-LEVEL T-PROC; DEFP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /*EXTRACT RTN_CODE AND PSETID*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RTN_CODE = TP - > DEFP_RTN.RTN_CODE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (P, TP, RP)PTR, NULL BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CALL TCALL ('DEFP', 1,RP, TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /+SET UP MSG TO CALL DEFP+/
                                                                                                                                                                                                                                                                                                                                                                              INTRA-LEVEL T-PROC:
                                                                                                                                                                                                                                                                                                                                                                                                 INTRA-LEVEL S-PROC:
                                                       MODULE
                                                                                                                                                                                                                                                                     DUTPUT PARAMETERS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF FDEBUG. LEV! THEN DO:
                                                                                                                                                                                                                                                                                                                          CALLS PROCEDURES:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEFP_ARG.PTYPE=PTYPE;
DEFP_ARG.PLEN=PLEN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ALLOCATE DEFP ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PSETID BIT(32);
                                                                                                                                                                                                                                   DEFP ARG:
                                                                                                                                                                                                                                                                                                                                                              ADEFP:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RIN CODE=0:
                                                                                                                                                                                                                                                                                                                                                            41NCLUDE
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DFP00580
DFP00590
DFP00600
DFP00610
DFP00630
DFP00640
DFP00650
DFP00660
       DFP00560
DFP00570
/*NOTE THAT THIS ROUTINE INTERFACES WITH IMPLEMENTAION OF THE N-ARY LEVEL, THEREFORE SUBJECT TO CHANGE IF DESIGN OF N-ARY LEVEL CHANGES*/
IF TYPE='E' THEN DO;
DEFP_ARG.IMP.HOW=DEFPHOW.SA; /*STAND ALONE*/
DEFP_ARG.IMP.NUMPTR=12;/*DEFAULT TO12*/
END;
                                                                                                                                             DEFP_ARG.IMP.HOW=DEFPHOW.SA; /*ALSO STAND ALONE*/
DEFP_ARG.IMP.NUMPTR=4; /*DEFAULT TO 4*/
END;
                                                                                                                                                                                                  END /*IMPP*/;
END /*DFP1*/;
                                                                                                                                 ELSE DO;
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FILE: DMB

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7
PLIOPT
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DMBOOCO 10
DMBOOCO 20
DMBOOCO 20
DMBOOCO 50
DMBOOCO 50
DMBOOCO 50
DMBOOCO 50
DMBOOCO 50
DMBOOCO 50
DMBOOCO 10
DMBOO 110
DMBOO 110
DMBOO 120
DMBOO 140
DMBOO 150
DMBOO 160
DMBOO 160
DMBOO 160
DMBOO 160
DMBOO 160
DMBOO 170
                                                                   PUT SKIP LIST('-- DATA MANIPULATION SESSION --');

DO WHILE ('148); /+DO FOREVER+'

DO WHILE ('148); /+DO FOREVER+'

PUT SKIP LIST ('DM: ENTER MANIPULATION COMMAND:');

PUT SKIP LIST ('CREATE(CRT), MODIFY(MOD), DELETE(DEL), QUERY(QUE)');

DAGE EDIT (CMD);

WHEN ('CREATE', 'CRT', 'C') CALL DMC;

WHEN ('CREATE', 'OR', 'MOD', 'M') CALL DMM;

WHEN ('OLETE', 'DEL', 'D') CALL DMM;

WHEN ('OLETE', 'DEL', 'D') CALL DMM;

WHEN ('QUERY', 'QUE', 'Q') CALL DMG;

WHEN ('8)'') LEAVE;

DOMB

WHEN ('8)'') LEAVE;

DOTHERWISE PUT SKIP LIST('ILLEGAL COMMAND, (PLEASE USE UPPER CASE)');

DMB

END /+SELECT+/;
                 DMB: PROC;
DCL CMD CHAR(7);
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END /\*DM\*/;

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DMC00370
DMC00380
                    DMC00020
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CALL LEXT (N,TOKEN,T1,T.TN,PRED,OP.RTN_CODE);/*BUILD T STRUCTURE*/
IF RIN_CODE^*O THEN DO;
PUT_SKIP LIST ('IMPROPER SYNTAX, PLEASE RE-ENTER');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /+ VNM1 WILL PRINT ERR MSG IF ANY+/
/+ ESET NAME ERROR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL UPE! (OPE, T.OP, RTN_CODE); /+UPE! WILL PRINT ERR MSG IF ANY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A:PUT SKIP LIST ('ENTER NAMES OF ATTRIBUTES SEPARATED BY COMMA');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MODE*1; /*SUPPRESS BLANKS*/
CALL LEX (N, TOKEN, MODE,RTN_CODE);/*GET INPUT LINE THRU LEX*/
IF RIN_CODE^=0 THEN DO;
PUT SKIP LIST ('IMPROPER SYNTAX (LEX), PLEASE RE-ENTER');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DO 1=1 TO 25; OP(I)='N'; /*INITIALIZE OPS TO BE 'IST' +/
PUT SKIP LIST ('ENTER DATA:');
                                                                                                                                                                                                                                                                                                N1 FIXED BIN; /+USED TO COMM. WITH VNM1+/
1 PRED(25),/+ STRUCTURE TO COMMUNICATE WITH LEXT+/
                                                                                                                                                                                                /*THE FOLLOWING USED TO CALL LEX*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /* ATTR NAME ERROR
                                                                                                                                                                                                                                                                                                                                                                                                                 DO WHILE ('1'8); /+DO FOREVER+/
A1:PUT SKIP LIST ('CREATE: ENTER ENTITY SET NAME');
CALL LEX (N,TOKEN,1,RTN_CODE);
IF N = O THEN LEAVE; /*GET OUT OF DMC+/
T.ENAME = TOKEN.D(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*START ASKING FOR DATA THROUGH SUBROUTINE UPE1*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /*CALL UP VNME TO CHECK FOR LEGALITY OF NAMES*/
DMC: PROC; /*PROCESSING CREATE COMMANDS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF N=O THEN LEAVE; /+GET OUT OF DMC+/
                    %INCLUDE ELEX,ELEXT,EVNM1,EUPE1;
DCL 1 T, /*DATA STRUCTURE OF NAMES */
                                                                               2 IN FIXED BIN, /*NUMBER OF ATTR+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ELSE IF N1 ^= 0 THEN GO TO A;
                                                                                                                                                                                                                                                                                                                                     2 OP CHAR (1), /+ +, >, <, +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALL VNM1(T,RTN CODE,N1);
IF NI=-1 THEN GO TO A1;
                                                                                                                                                                             (OP(25), OPE) CHAR(1);
N FIXED BIN; /*THE F
                                                                                                                    3 PARENT FIXED BIN.
                                                                                                                                      3 ANAME CHAR (8);
                                                                                                                                                                                                                                                                                                                                                      2 VALUE CHAR (40),
2 VLEN FIXED BIN;
                                                                                                                                                           CODE FIXED BIN;
                                                            2 ENAME CHAR(8).
                                                                                                                                                                                                                                      2 D CHAR(40).
2 L FIXED BIN;
MODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /+DO WHILE+/;
                                                                                                                                                                                                                                                                                                 N1 FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GD TO A;
                                                                                                                                                                                                                    1 TOKEN(25).
                                                                                                 2 11 (25).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GO TO A;
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VM/SP CONVERSATIONAL MONITOR SYSTEM

DMC00560 DMC00570

PAGE 002

PLIOPT A1 FILE: DMC

RETURN; END /+DMC+/;

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DMD00190
DMD00200
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A:PUT SKIP LIST ('ENTER IDENTIFIER ATTRIBUTE NAMES. SEPARA'E BY COMMA'DMDOO320
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CALL LEXT (N.TOKEN.T1,T.IN.PRED.OP,RTN_CODE);/*BUILD T STRUCTURE*/
IF RIN_CODE^*O THEN DO;
PUT SKIP LIST ('IMPROPER SYNTAX, PLEASE RE-ENTER');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL LEX (N, TOKEN, MODE,RIN_CODE);/+GET INPUT LINE THRU LEX+/
IF RIN_CODE^=0 THEN DO;
PUT SKIP LIST ('IMPROPER SYNTAX (LEX), PLEASE RE-ENTER');
                   %INCLUDE ELEX,ELEXT,EVNM1,EUPE1;
DCL 1 T, /+DATA STRUCTURE USED TO COMMUNICATE WITH LEXT+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ;;
                                                                                                                                                                                                                                                                               N1 FIXED BIN; /*USED TO COMM. WITH VNM1*/
1 PRED(25),/* STRUCTURE TO COMMUNICATE WITH LEXT*/
                                                                                                                                                                                    N FIXED BIN; /+THE FOLLOWING USED TO CALL LEX+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DO WHILE ('1'B); /*DO FOREVER*/
A1:PUT SKIP LIST ('DELETE: ENTER ENTITY SET NAME');
CALL LEX (N, TOKEN, 1, RIN CODE);
If N = O THEN LEAVE; /*GEI OUT OF DMD*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /+START ASKING FOR DATA THROUGH SUBROUTINE UPE1+/
                                                                                                                                                                                                                                                                                                                                                                                                                               EDIT (CMD) (A(B)); IF CMD='YES' THEN CALL HELP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ELSE IF NI ^= 0 THEN GO TO A; /+ ATTR NAME ERROR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*CALL UP VNME TO CHECK FOR LEGALITY OF NAMES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /* ESET NAME ERROR
/*PROCESSING DELETE COMMANDS*/
                                                       2 ENAME CHAR(B).
2 IN FIXED BIN, /+NUMBER OF ATTR+/
                                                                                                                                                                                                                                                                                                                                                                                                               SKIP LIST ('TYPE YES IF NEED HELP');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF N=O THEN LEAVE; /+GET OUT OF DMD+/
                                                                                                                                                                                                                                                                                                                   OP CHAR (1), /* *, >, <, */
VALUE CHAR (40).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MODE = 1; / + SUPPRESS BLANKS + /
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CALL VMMI(T,RTN_CODE,N1);
IF NI=-1 THEN GO TO A1;
                                                                                                            3 PARENT FIXED BIN.
                                                                                                                                                                   OPE) CHAR(1);
                                                                                                                            3 ANAME CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1. ENAME = 10KEN.D (1);
                                                                                                                                                 RTN CODE FIXED BIN:
                                                                                                                                                                                                                                                                                                                                                         VLEN FIXED BIN;
                                                                                                                                                                                                                                              2 L FIXED BIN;
                                                                                                                                                                                                                           D CHAR(40).
                                                                                                                                                                                                                                                               MODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                            CMD CHAR (8);
                                                                                                                                                                                                       I TOKEN(25),
                                                                                           2 II (25),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GO TO A:
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FILE: DMD

FUI SKIP LIST ('ENTER DATA:'); DADOOSOO
DO 1 = 1 TO 25: DP(1) = '1': END: /*INITIALIZE ALL OPS TO ID */ DMDOO580
CALL UPE1 (OPE.T.OP.RTN CODE); /+UPE1 WILL PRINT ERR MSG IF ANY +/ DMDOOGOO
01900@0
END /+DD WHILE+/; DMDO0620
RETURN; DMDO0630
DMD00640
/*************************************
HELP: PROC: /*** INTERNAL SUBROUTINE ******/
PUT SKIP LIST (********* BRIEF EXPLANATION ON HOW TO DO DELETE ***'); DMDOOG70
PUT SKIP LIST ('AT THE PROMPT FOR IDENTIFIER ATTRIBUTE NAMES PLEASE'); DMDOOGBO
LIST ('IDENTIFY THE ENTITY TO BE DELETE.');
SKIP LIST
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SKIP LIST('AND LATER ENTER EMPNUM AT THE PROMT FOR DATA');
SKIP LIST ( ********* NOW IRV IT ***********************************
OOBOODWO
END /+DMD+/:

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                                                                                  **************
                                                                   CALL UPE1 TO GET DATA FROM USER AND SET UP CALL TO UPDE
                                                                                                                                                                                                       1. INPUT ENTITY SET NAME IN T.ENAME.
2. CALL LEX TO INPUT AND PARSE ATTRIBUTE LIST INTO TOKENS.
3. CALL LEXT TO BUILD NAME TREE AND OP TABLE.
                                                                                                                                                                                                                                                                                                                                          INTER-LEVEL T-PROC: NONE
INTRA-LEVEL T-PROC: NONE
INTRA-LEVEL S-PROC: LEX,LEXT,VNM1,UPE1.
CONTROL STRUCTURE, PANEL MANAGER AND DEBUGGING FACILITIES:
                                                                                                                 THIS IS A S-PROC AT THE USER INTERFACE LEVEL, CALLED BY MODULE DMB, TO PROCESS USER DATA MODIFICATION COMMAND WITHIN A USER DATA MANIPULATION - MODIFICATION SESSION.
                                                                                                                                                                                                                                                       CALL VNM1 TO SET UP CALL TO VNME AT THE NEXT LEVEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                 %INCLUDE ELEX,ELEXT,EVNM1,EUPE1;
DCL 1 T,  /*DATA STRUCTURE USED TO COMMUNICATE WITH LEXT*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*THE FOLLOWING USED TO CALL LEX*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NI FIXED BIN; /*USED TO COMM. WITH VNM1*/
1 PRED(25),/* STRUCTURE TO COMMUNICATE WITH LEXT*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DO WHILE ('1'8); /*DO FOREVER*/
A1:PUT SKIP LIST ('MODIFY: ENTER ENTITY SET NAME');
CALL LEX (N,TOKEN,1,RTN_CODE);
IF N = 0 THEN LEAVE; /*GET OUT OF DMC*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PUT SKIP LIST ('TYPE YES IF NEED HELP');
GET EDIT (CMD) (A(B)); IF CMD='YES' THEN CALL HELP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /*NUMBER OF ATTR*/
                                                  DESCRIPTION
DAMM: PROC: /*PROCESSING CREATE COMMANDS*/
                                                                                                                                                                                                                                                                                                                                                                                                                  NON
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2 VALUE CHAR (40),
                                                                                                                                                                                                                                                                            TO VERIFY NAMES.
                                                   MODULE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    3 PARENT FIXED BIN,
3 ANAME CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RIN CODE FIXED BIN;
(OP(25), OPE) CHAR(1);
                                                                                                                                                                                                                                                                                                                           CALLS PROCEDURES:
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2 IN FIXED BIN,
2 II (25),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2 VLEN FIXED BIN;
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                                                                                                    PURPOSE:
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A:PUT SKIP LIST ('ENTER MODIFICATION OPERATORS AND NAMES OF ATTRIBUTEDUMOOS70
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ('THAT WILL BE THUS MODIFIED. YOU SHOULD ALSO PROVIDE'); DUMOO940
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                                                                                                                                                                                                        CALL LEXT (N,TOKEN,T1,T.TN,PRED,OP,RTN_CODE);/*BUILD T STRUCTURE*/
                                                                                                                                                                                                                                                                                                                                         ANY *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ('essesses NOW TRY IT sessessessessessessesses');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 'TO IDENTIFY THE ENTITY TO BE MODIFIED. AN EXAMPLES');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL LEX (N. TOKEN, MODE,RTN_CODE);/*GET INPUT LINE THRU LEX*/
IF RIN_CODE^=0 THEN DO;
PUT SKIP LIST ('IMPROPER SYNTAX (LEX), PLEASE RE-ENTER');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /+ UPE1 WILL PRINT ERR MSG
                                                                                                                                                                                                                                                                                                                                         1
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  '-ID:EMPNUM,-REP:WORKS IN(DEPTNUM)');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               'PROMPT FOR ATTRIBUTE NAMES AND MODIFICATION');
                                                                                                                                                                                                                                                                                                                  /*CALL UP VNME TO CHECK FOR LEGALITY OF NAMES*/
CALL VNM1{T,RTN_CDDE,N1}; /* VNM1 WILL PRINT ERR MSG
IF N1 = -1 THEN GO TO A1; /* ESET NAME ERROR
                                                                                                                                                                                                                           RIN_CODE^=O THEN DO;
PUT_SKIP LIST ('IMPROPER SYNTAX, PLEASE RE-ENTER');
                                                                                                                                                                                                                                                                                                                                                                            /* ATTR NAME ERROR
                                                                                                                                                                                                                                                                                                                                                                                                              /+START ASKING FOR DATA THROUGH SUBROUTINE UPE1+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HELP: PROC; /**** INTERNAL SUBROUTINE *******
                                                                                                                                                                   IF N*O THEN LEAVE; /*GET OUT OF DMC*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL UPE: (OPE,T.OP,RTN_CODE);
END /+DO WHILE+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                   PUT SKIP LIST ('ENTER DATA:');
                                                                                                                                                                                                                                                                                                                                                                             ELSE IF NI >= 0 THEN GO TO A;
                   S SEPARATED BY COMMAS');
MODE*1; /*SUPPRESS BLANKS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OPERATORS: ');
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                                                                                                                G0 T0 A:
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                                                                                                                                                                                                                                                                                       INTER-LEVEL T-PROC: RETE.
INTRA-LEVEL T-PROC: NONE.
INTRA-LEVEL S-PROC: LEX,LEXT,PRNT
CONTROL STRUCTURE, PANEL MANAGER AND DEBUGGING FACILITIES:
                                                                                                  ** S-PROC AT THE USER INTERFACE LEVEL, CALLED BY THE DWB WODULE, ** PROCESS QUERY REQUESTS ISSUED BY THE USERS WITHIN A DATA ** MANIPULATION - QUERY SESSION.
                                                                                                                                                                              1. CALLS LEX TO PARSE INPUT STRING INTO TOKENS.
2. CALLS LEXT TO BUILD NAME TREE AND PREDICATE TABLE.
3. SET UP RETE CALL TO THE NEXT LEVEL.
4. CALL PRNT TO PRINT RESULT.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /*USED TO COMM. WITH VNM1*/
/* PRED AND MOP COMMUNICATE WITH LEXT*/
                                                                                                                                                                                                                                                                                                                                                                                                                %INCLUDE ELEX,ELEXT,SERVICE,ARETE,EPRNT;
DCL 1 T, /*DATA STRUCTURE USED TO COMMUNICATE WITH LEXT*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      N FIXED BIN; /*THE FOLLOWING USED TO CALL LEX*/
                                            DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (25) CHAR (1);/* NOT USED IN DMQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SKIP LIST ('..-QUERY SESSION--');
SKIP LIST ('TYPE YES IF NEED HELP');
EDIT (CMD) (A(B));
                                                                                                                                                                                                                                                                                                                                                                                                                                                             IN FIXED BIN, /*NUMBER OF ATTR*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (TP.P.RP.LP) PTR. NULL BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1 PRED(25), /* PRED AND 2 OP CHAR (1), /* =,>,<, +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         3 PARENT FIXED BIN. 3 ANAME CHAR (8);
                                                                                        THIS IS A
                                            MODULE
                                                                                                                                                                                                                                                                                                                                                        TCALL, SVC3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VALUE CHAR (40),
                                                                                                                                                                                                                                                                           CALLS PROCEDURES:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RTN_CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLEN FIXED BIN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 TOKEN(25),
2 D CHAR(40),
2 L FIXED BIN;
MODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                           2 ENAME CHAR(8),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          I FIXED BIN (31);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CMD CHAR (B);
                                                                                           PURPOSE:
                                                                                                                                                                    ME THOD:
DMO: PROC:
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IF CMD='YES' THEN CALL HELP

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                                                                                                               DUMO1
                                                                                                                                                                                                                                                                                                                                                                                                          ('THE SYSTEM WILL ASK YOU TO PROVIDE THE NAMES');

('OF THE ENITY SET YOU ARE TO QUERY ABOUT,');

('AND THE LIST OF ATTRIBUTES OF THIS ENITY SET');

('OF INTEREST TO YOU. YOU MAY ALSO PROVIDE PREDICATES');

('ALONG WITH THE LIST OF ATTRIBUTES. ATTRIBUTES IN');

('YOUR ATTRIBUTE LIST SHOULD BE SEPARATED BY COMMAS.');

('THE FOLLOWING IS AN EXAMPLE OF AN ATTRIBUTE LIST');

('PROVIDED BY A USER QUERYING ABOUT AN ENTITY SET');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ('EMPLOYEE. THIS USER IS INTERESTED IN THE EMPNUM'); ('AND EMPNAME OF EMPLOYEES OLDER THAN 56 AND WORK IN');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      HELP: PROC; /*INTERNAL SUBROUTINE */
PUT SKIP LIST ('****** BRIEF EXPLANATION ON HOW TO USE QUERY *******
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /* INTERNAL SUBROUTINE FOR RETE ERROR */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               THEN PUT SKIP EDIT ('ILLEGAL PREDICATE DATA FOR ', T.ANAME(CODE-101))
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF CODE > 200 THEN PUT SKIP EDIT ('RETN RETURN CODE '. CODE)(A,F(3));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           THEN PUT SKIP EDIT ('ILLEGAL ATTRIBUTE ',T.ANAME(CODE-101))(A,A);
                                                                                                                                                                                                                                                                                                                                         PUT SKIP LIST ('PROBLEM IN QUERY STATEMENT: PLEASE REISSUE');
CALL TCALL ('RETE', 1,RP,TP); /* TP-> RETE_RTN */
IF TP->RETE_RTN.RTN_CODE ^* 0 /* CHECK RETE RETURN CODE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 'DEPT WITH DEPINUM 15:');
'EMPNUM,EMPNUM,EMPNUM=15)');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CODE = 100 THEN PUT SKIP LIST ('NO SUCH ENTITY SET.');
                                                         CALL RETEMSG (TP->RETE_RTN.RTN_CODE);
CALL SVC3 (RP); CALL SVC3 (TP);
                                                                                                                                                TP->RETE RIN.N = 0 THEN DO;
PUT SKIP LIST ('ND DATA FOUND');
CALL SVC3 (RP); CALL SVC3 (TP);
                                                                                                                                                                                                                                                                CALL PRNT (RP,TP,RTN_CODE);
CALL SVC3 (RP); CALL SVC3 (TP);
END /+DO WHILE +/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (A,A);
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                                                                                             GO TO A1:
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                                                                                                                                                                                                          GO TO A1;
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VM/SP CONVERSATIONAL MONITOR SYSTEM	
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SYSTEM	DUMO 1660 DUMO 1670 DUMO 1680
MONITOR	/*****
VM/SP CONVERSATIONAL MONITOR SYSTEM	***
VM/SP	/
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                                                                                                                                                                                                                                                                                                                       **** CALLS PROCEDURES: RINIT, CINIT, VSAVE, USER;

**** (INTRA-LEVEL S-PROCS: RINIT, CINIT, VSAVE, USER;

**** (INTRA-LEVEL S-PROCS: RINIT, CINIT, USED FOR INITIALIZING THE

**** (RELATIONAL VIEW PROCESSOR AND THE BN VIEW PROCESSOR, BOTH

**** ARE CURRENTLY INCLUDED IN THE TOP LEVEL BUT EVENTUALLY WILL

BE DEDICATED TO THE VIL. WHICH DOES NOT EXIST VET.

**** USER: ENTER INTO USER MODE FROM CONSOLE.

**** INTER-LEVEL T-PROC: VINIT, VSAVE: USED FOR PERCOLATING INIT

**** AND SAVE COMMANDS TO THE NEXT LEVEL.)
                                                                                                                                                                                                  IT ASKS FOR INIT METHOD FROM THE CONSOLE USER. IF FILE INIT, IT ASKS FOR FILE NAME AND PERCOLATES THE FILE INIT DOWN. IF NEW INIT, IT CALLS SBRS TO INITIALIZE CAT FILES OF THIS LEVEL AND PERCOLATES THE NEW INIT DOWN.
                                                                                                     PUT SKIP (2) LIST ('--FUNCTIONAL HIERARCHY STV CONSOLE PROGRAM--');
/*** A DRIVER PROGRAM USED WHEN FH IS RUN WITHOUT CONTROL STRUCTURE
                                                                                                                                            AN EXISTING FILE OR FROM SCRATCH, AND CONSOLE LOGOUT
                                                                                                                        PURPOSE: A T-PROC FOR CONSOLE INITIALIZATION FROM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*XINCLUDE EUSER; /*INTRA-LEVEL S-PROC ENTRY DCLS*/
%INCLUDE AVINI ; /*INTER-LEVEL T-PROC ARG LIST*/
%INCLUDE SERVICE; /*CONTROL STRUCTURE SERVICES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /* SETS UP TRACE OPTIONS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DO WHILE ('1'8);
PUT SKIP LIST ('INITIALIZATION: FILE OR NEW:');
GET EDIT (NAME) (A(8));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DCL (NAME, FNAME) CHAR(8);
DCL SAVESH FILE RECORD BUFFERED SEQUENTIAL ENV
(U BLKSIZE(30016) );
                                                                DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RTN_CODE FIXED BIN(15);
(TP,P) POINTER;
                                                                  MODULE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DCL OUT BIT(1) INIT ('0'B)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KINCLUDE FOEBUG, SH;
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                                                                                   GET EDIT (FNAME) (A(B));
CALL READ (FNAME); /*READ IS INT SBR TO READ FILE INTO SH*/
CALL NEXTI;/*INT SUBR TO SET UP CALL FOR FILE INIT AT NEXT LV*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL CINIT; /*BN VIEW PROCESSOR INIT*/
FNAME=(8) ' ';
CALL NEXTI;/*INT SBR TO SET UP CALL FOR NEW INIT IN NEXT LV*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TOT RUN TIME
                                                                                                                                                                                                                                                                                                                                                                                                                                                /*AFTER INITIALIZATION, CONSOLE MAY CHOOSE TO ENTER USER MODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PUT SKIP LIST ('SAVE FILE: FILE NAME?');
GET EDIT (FNAME) (A(B));
IF FNAME ^= '' THEN CALL SAVE(FNAME);
/*SAVE IS INT SBR TO SET UP CALL TO NEXT LEV FOR SAVING DATA*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DIHERWISE PUT SKIP EDIT(NAME,' IS NOT A COMMAND')(A,A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  COUNT TOT ELAPSED TIME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (SKIP, F(3), X(4), A, F(7), F(17), F(13), F(21));
                                                                                                                                                                        EN ( 'N' , 'NEW','n','new') DO; /* NEW INIT*/
ALLOCATE PACKET IN (SH);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DCL ((ETIME, ELD, ECDUNT)(50) FIXED BIN(31)) EXT;
DCL FTIME BIT(1) EXT;
                                                                                                                                                                                                                                CALL RINIT; /*REL VIEW PROCESSOR INIT*/
                                                                                                                                                                                                                                                 /+BN VIEW PROCESSOR INIT+/
                                 WHEN ( 'F' , 'FILE','f','file') DO;
                                                                    PUT SKIP LIST ('FILE NAME?');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /+CONSOLE LOG OUT AND SAVE FILE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PROCNAME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TIME/INVOCATION')(SKIP,A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL TCALL ('USER', 1, TP, P);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ----')(SKIP,A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL FINISH; /*SUICIDE***/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (61 OT 1=1 00
                                                                                                                                                                                                                                                                                                                                                                                          IF OUT THEN LEAVE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF FTIME THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PUT EDIT ('LEVEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PUT EDIT ('----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                XINCLUDE FSTRUC;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ON ZERODIVIDE;
SELECT (NAME):
                                                                                                                                                                                                                OUT='1'B;
                                                     06/1-11/8:
                                                                                                                                                                             WHEN ( 'N'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FREE SH.
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DUMO 1 150
DUMO 1 160
DUMO 1 170
DUMO 1 180
DUMO 1 190
DUMO 1200
DUMO 1200
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /*IN THE FUTURE, THIS MODULE INITIALIZES THE BASE DATA MODEL VIEW SUBSYSTEM; PRESENTLY IT IS NOT AVAILABLE*/
                                                                                                                                                                                                                                                                                                                                                                                     /* OFFSET OF PACKET IN SH +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VIEW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   READ: PROC(FNAME);/*SBR TO READ FILE INTO STORAGE HIERARCHY*/
         EXII: PROC: /* INT SBR FOR PASSING INIT DOWN NEXT LEVEL+/
ALLOCATE VINIT ARG; /*SET UP ARG LIST*/
VINIT ARG.PTR=NULL;
VINIT ARG.FNAME;
IF FDEBUG.LEVO THEN PUT SKIP LIST ('FSTV CALLS VINIT');
CALL TCALL ('VINIT', 1,P,TP);
IF FDEBUG.LEVO THEN PUT SKIP LIST ('FSTV: VINIT RETURNS');
CALL SVC3 (P);
                                                                                                                                                                                                                                                                                                                 SAVE:PROC(FNAME); /* SAVE EVERYTHING IN STORAGE HIERARCHY*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /*IN THE FUTURE, THIS MODULE INITIALIZES THE RELATIONAL SUBSYSTEM; PRESENTLY IT IS NOT AVAILABLE*/
                                                                                                                                                                IF TP->VINIT RTN.RTN CODE >=O THEN DO;
PUT SKIP LIST ('ERROR IN INITIALIZATION, RESTART');
OUT='0'8; /*REST INIT LOOP*/
 /***INTERNAL SUBROUTINES******************/
                                                                                                                                                                                                                                                                                                OPEN FILE(SAVESH) TITLE(FNAME) OUTPUT;
WRITE FILE(SAVESH) FROM(SH);
WRITE FILE(SAVESH) FROM(PP); /* OF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    OPEN FILE (SAVESH) TITLE (FNAME) INPUT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       READ FILE(SAVESH) INTO(SH);
READ FILE(SAVESH) INTO(PP);
                                                                                                                                                                                                                                                                                                                                                                                                            CLOSE FILE (SAVESH);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CLOSE FILE (SAVESH);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DCL FNAME CHAR(B):
                                                                                                                                                                                                                                                                                                                                 DCL FNAME CHAR(8);
                                                                                                                                                                                                                                          CALL SVC3 (TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                END /* SAVE */;
                                                                                                                                                                                                                                                             END /*NEX[1*/;
                 NEXTI: PROC:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CINIT: PROC:
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END /\*FSTV\*/;

DUM00010	DUM00030 DUM00040	DUMO0050 DUMO0060	DUMOOOTO DUMOOOBO	DUMOCO90	DUMO0110
L1:PROC(ARGPIR); /* A DUMMY ROUTINE TO SIMULATE ENTIRE SH-STV */ /* USED WHEN RUN WITHOUT CONTROL STRUCUTRE AND DSH +/	KINCLUDE ARG.SH; DCL INDX FIXED BIN(31);	INDX = ARG.VIRTUAL_ADDRESS/8 + 1;	IT ANG. REQ TYPE # 'READ' THEN ARG. DATA # PACKET(INDX);	ELSE PACKET(INDX) = ARG.DATA; RETURN;	END;

PLIOPT

FILE: DUMPIT

FILE: DUMTBEG PLIOPT A1

DUMO0010 DUMO0020 DUMO0030	DUMO0040		_	_	DUMO0090	<b>DUMO0100</b>	DUMO0110	DUMO0120	DUMO0130	DUM00140
TBEG: PROC (PROC_ADDR,P); /**** A SERVICE ROUTINE TO STRIF OFF MSG TOKEN FROM A CALLING ***	*** ARGUMENT LIST; IT IS USED BY A T-PROC WHEN IT IS INVOKED ***/	/*** PROC ADDR CONTAINS THE PROC ADDR OF THE CALLING PROCEDURE, ***	*** P WILL PUNT TO THE FIRST TOKEN OF THE CALLING ARGUMENT LIST. +/	DCL STAT_PI PTR EXTERNAL STATIC;	DCL P PTR;		P= STAT_P1:	RETURN;	END;	

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DUM00020
             DUMO0030
                           DUMO0040
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                                                                     DUMO0070
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                                                                 /* FTCALL IS DEBUG TRACE BIT */
/* FTIME IS TIMING TRACE BIT*/
/* FSTRUC IS STRUCTURE OF FH */
                                                                                                                                                                                                                                                                                                                                         If FICALL(I) /* IF TCALL TRACE BIT FOR THAT LEVEL IS ON*/
THEN PUT SKIP EDIT ('TCALL: ',PROCNAME)(A,A);
                                                                                                                                                                                                                                                                                                                                                                      (VINIT, DEFE.RETE, UPDE, DEFP, DEFB, RETN) ENTRY;
(UPDN, DEFA, NINIT, VNME, SHWE) ENTRY;
(MINIT, RET, REP, DEL, CRT, FSTV, USER) ENTRY;
I FIXED BIN, (STAT P1, STAT P2) PTR EXTERNAL STATIC;
(P1, P2)PTR; DCL (BEGTIME, ENUM, LOTIME CTL) FIXED BIN(31);
RTIMER ENTRY RETURNS(FIXED BIN(31));
(ECOUNT(50), ELO(50), ETIME(50)) FIXED BIN(31) EXT INIT((50)0);
                         /*THIS IS A DUMMY TCALL TO HANDLE PROBLEM OF CONTROL STRUCTURE*/
/* IT IS USED TO INSULATE FH MODULES FROM CONTROL STRUCTURE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                         / ***********************
                                                                                                                                                                                                                                                        /* FIND LEVEL
                                                                                                                                                                                                                                                                    IF ARCH. PROCNAME (ENUM) - PROCNAME THEN LEAVE;
 ICALL: PROC (PROCNAME, I.P1, P2) RECURSIVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALL RETE;
CALL UPDE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL DEFP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CALL DEFB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CALL VINIT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL VNME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL DEFE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CALL RETN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL UPDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL NINIT:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL DEFA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL FSTV;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MINIT:
                                                                     DCL FTCALL(4) BIT(1) STATIC EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CRT:
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL RET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL
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                                                                                                                                                                                                                                                                                                                                                                                                                              ALLOCATE LOTIME; LOTIME=0;
                                                                                                              PROCNAME CHAR(7) ;
                                                                                  FTIME BIT(1) EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SELECT (PROCNAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                             BEGTIME -RTIMER; END;
                                                                                                                                                                                                                                                                                                 I * ARCH. LEVEL (ENUM)
                                                                                                                                                                                                                                                         DO ENUM = 1 TO 18
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VINIT.
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                                                                                                  KINCLUDE FSTRUC;
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FILE: DUMTCALL PLIOPT A1

DUMO0560 DUMO0570 DUMO0580		DUMOOG30 DUMOOG40 DUMOOG50		DUMO0700 DUMO0710 DUMO0720	DUMO0730 DUMO0740 DUMO0750	DUMO0760
OTHERWISE DO;PUT SKIP EDIT (' *** NAME NOT FOUND') (A); SIGNAL ERROR; END; END;	/*WHEN RETURNED*/ /**********************************	BCG1.WE=N   MEM-BEGINE; ETIME(ENUM)=ETIME(ENUM)+BEGTIME; ECOUNI(ENUM)=ECOUNI(ENUM)+1; ELO(ENUM)=ELO(ENUM)+CTIME	FREE LOTIME; IF ALLOCATION(LOTIME)~= O THEN LOTIME=LOTIME+BEGTIME;  /***********************************	/********** TCALL TRACE ************************************	PUI EDIT(' ***TCALL: END ',PROCNAME)(A,A); /************************************	END /* TCALL*/;

	DUMO0040 DUMO0050 DUMO0060	DUMO0070 DUMO0080	DUMO0090 DUMO0100	DUMOO 1 10 DUMOO 1 20	DUMOO 130 DUMOO 140	DUMOO 150 DUMOO 160	DUMOO 170 DUMOO 180	DUMOO 190
TRIN: PROC(PROC_ADDR, RTP); /*** A SERVICE ROUTINE USED BY A T-PROC WHEN IT FINISHES PROCESSING	**** IT ADDS A MSG TOKEN TO A RETURN ARGUMENT LIST AND CALLS SVCS2 *** AND THEN FINISHES ITSELF ****/	/*** PROC. ADDR CONTAINS THE ADDRS OF THE CALLING PROCEDURE TO RETURN *** THE RETURN MSG TO: RIP POINTS TO THE RETURN ARGUMENT LIST ***/		XINCLUDE FDEBUG; DC: (P RTP) PTR RIN CODE FIXED BIN:	DCL 1 T BASED (P)	DCL STAT P2 PTR EXTERNAL STATIC;		EMD /+TRTN+/;

EBOT : PROC

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/*A S-PROC AT THE ENTITY LEVEL USED BY VINIT MODULE TO BOOTSRAP
             BIT_STRING BIT(232) BASED; /*BIT STRING FORM OF AINFO*/
BAINFO(5) BIT(232);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      UPDN_ARG.OP=UPDNOP.CI; /+CI IS CREATE AND INSERT+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                UPDN_ARG.PSETID=KEY(KY.PENAME);
UPDN_ARG.BSETID=KEY(KY.BENAME);
UPDN_ARG.DLEN=8;
IF J=1 THEN UPDN_ARG.DATA=UNSPEC ('E*ESET
ELSE UPDN_ARG.DATA=UNSPEC ('E*ASET');
                                                                                                                                                                                                                                                                                                                                                                                                                                               DO J=1 TO 2; /+FOR TWO ENTITY SETS ESET AND ASET*/
                                                                                                                                                                     MLEN FIXED BIN INIT (8, 4,0,8,29), FUNC CHAR(1) INIT ('K','S','M','S','S'), TYPE CHAR (1) INIT('V','V','E','V','V'), VIYPE CHAR (1) INIT ('C','B','','C','B'),
                                                                                                                                                                                                                                                                                                                                                                                             BAINFO(I) = ADDR(MAINFO(I)) -> BIT_STRING;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               UPDN_ARG.PSETID=KEY(KY.PEINFO);
UPDN_ARG.BSETID=KEY(KY.BEINFO);
                                                                                                                                                                                                                                                                    SEQ(5) FIXED BIN INIT (2,3,1,5,6);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALLOCATE UPDN ARG; LP,RP=P;
UPDN ARG.PSETĪD=KEY(KY.PESET);
UPDN ARG.OP=UPDNOP.CRT;
UPDN ARG.DLEN=O;
                                                                                                                                                                                                                                                                                                                                                                 MAINFO.BSETID(I) *KEY(I+6);
MAINFO.PSETID(I) *KEY(SEQ(I));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ALLOCATE UPDN ARG:
LP->UPDN ARG.PTR*P; LP*P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              END /*WHEN 1*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      UPDN_ARG.PARENT-1:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      UPDN ARG. NODE = I+1;
                                                                                                                                                                                                                                                                                                                   /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                     ADDR BUILTIN:
                                                                                                                                                                                                                                                                                                                                    /*SET UP BAINFO*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    WHEN (1) DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               WHEN (2) DO:
                                                                                                                                                                                                                                                                                                                                                   DO 1=1 TO 5;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DO I=1 TO 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SELECT (I);
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WHEN (1) UPDN ARG.DATA=UNSPEC('A+ENAME');
WHEN (2) UPDN ARG.DATA=UNSPEC('A+EINFO');
WHEN (3) UPDN ARG.DATA=UNSPEC('A+ESET');
WHEN (4) UPDN ARG.DATA=UNSPEC('A+AINFO');
WHEN (5) UPDN ARG.DATA=UNSPEC('A+AINFO');
END /*SELECT U*/;
                                                                                                                                                                                            DO .J=1 TO 5; /+5 ATTRIBUTE SETS IN THE CATALOGUE+/
             IF J= 1 THEN UPDN_ARG.DATA=KEY(KY.PESET);
ELSE UPDN_ARG.DATA=KEY(KY.PASET);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   UPDN_ARG.DATA=UNSPEC ('E+ESET ');
ELSE UPDN_ARG.DATA=UNSPEC ('E+ASET ');
                                                                                                                       END /+DO I+/;
CALL TCALL ('UPDN',1,RP, TP); /+CALL UP UPDN+/
END /+DO J+/;
                                                                                                                                                                                                                                                                                                   I=† TO 4;
ALLOCATE UPDN ARG;
LP->UPDN ARG.PTR=P; LP=P;
UPDN ARG.NODE=I+1; /*ASSIGN NODE NUMBER*/
                                                                                                                                                                                                                                                                                                                                                                                                                           UPDN_ARG.PSETID=KEY(KY.PANAME);
UPDN_ARG.PARENT=1;
UPDN_ARG.BSETID=KEY(KY.BANAME);
UPDN_ARG.DP=UPDNOP.CI;
UPDN_ARG.DLEN=8;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UPDN_ARG. PSETID=KEY(KY. PENAME);
UPDN_ARG. PARENT=3;
UPDN_ARG. BSETID=KEY(KY. BENAME);
UPDN_ARG. OP=UPDNOP. ID;
UPDN_ARG. DLEN=8;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               WHEN (2) DO; /+ESET NODE*/
UPDN ARG.PSETID*KEY(KY.PESET);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  UPDN_ARG.BSETID=KEY(KY.BESET);
UPDN_ARG.OP=UPDNOP.IST;
UPDN_ARG.DLEN=O;
END /*WHEN 2*/;
                                                                                                                                                                                                                                                                                                                                                                                                            WHEN (1) DO; /*ANAME NODE*/
                                                                                                                                                                                                            ALLOCATE UPDN ARG; RP, LP=P;
UPDN ARG. PSETID=KEY(KY. PASET);
UPDN ARG. OP=UPDNOP. CRT;
UPDN ARG. DLEN=O;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            WHEN(3) DO; /*ENAME NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    UPDN ARG. PARENT = 1;
                                                    END /+WHEN 2+/ ;
UPON ARG. DLEN-4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SELECT (J);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF J<3 THEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               END /*WHEN 1*/:
                                                                                     END /*SELECT 1*/;
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                                                                                                              /*IN THE FUTURE, THIS MODULE INITIALIZES THE BASE DATA MODEL VIEW SUBSYSTEM; PRESENTLY IT IS NOT AVAILABLE*/
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /*IN THE FUTURE, THIS MODULE INITIALIZES THE RELATIONAL VIEW SUBSYSTEM; PRESENTLY IT IS NOT AVAILABLE*/
PUT ED:T(((ARCH.LEVEL(I), ARCH.PROCNAME(I), ECOUNT(I), ETIME(I),
                                                                                                                                                                                                                                                                                                                  WHEN ('N', 'NEW', 'n', 'new') FNAME = '';
WHEN ('F', 'FILE', 'f', 'file') FNAME = 'F';
OTHERWISE GO TO GETI; END '+SELECT */;
ALLOCATE VINIT ARG; '+SET UP ARG LIST*/
VINIT ARG.FNAME=FNAME;
IF FDEBUG.LEVO THEN PUT SKIP LIST ('FSTV CALLS VINIT');
CALL TCALL ('VINIT', 1, P, TP);
IF FDEBUG.LEVO THEN PUT SKIP LIST ('FSTV CALLS VINIT');
                                                                                                                                                                                                                        NEXTI: PROC; /* INT SBR FOR PASSING INIT DOWN NEXT LEVEL+/
                                                                                                                                                                                                                                                               PUT LIST ('REGENERATE(NEW) OR OLD DATA BASE(FILE):');
GET EDIT (FNAME) (A(B));
                                                                        (SKIP.F(3).X(4).A.F(7),F(17),F(13),F(21));
                 (ETIME(I)-ELO(I)),
(ETIME(I)-ELO(I))/ECOUNT(I))
                                                                                                                                                                                                           /***INTERNAL SUBROUTINES*********************
                                                                                                                                                   CALL FINISH; / * SUICIDE */
                                                         00 1-1 10 19))
                                                                                                                                                                                                                                                                                                     SELECT (FNAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 END /*NEXTI*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   END /+FSTV+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CINIT: PROC:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RINIT: PROC;
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                                  /**** A S-PROC IN THE ENTITY LEVEL RESPONSIBLE FOR RETRIEVING ATTRI-
**** BUTE CAT ENTRY GIVEN ATTRIB NAME AND ENTITY NAME ********/
                                                                                                                    (ANAME, ENAME) CHAR (B);
(P,RP,LP,TP,RTP) PTR,(NULL,ADDR) BUILTIN;
BII_STRING BII (232) BASED;
RIN_CODE FIXED BIN, I FIXED BIN;
                                                                                   XINCLUDE DECAT, DKEY, ARETN, SERVICE, FDEBUG;
GACT: PROC (ANAME, ENAME, AINFO, RTN_CODE);
                                                                                                                                                                                           UNSPEC BUILTIN, STRING BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RETN ARG. PRED. DATA-UNSPEC (ANAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                         ALLOCATE RETN ARG;

LP->RETN ARG. PTR=P; LP=P;

RETN ARG. PSETID=KEY(KY. PANAME);

RETN ARG. NODE=2;

RETN ARG. PARENT=4;

RETN ARG. BSETID=KEY(KY. BANAME);

RETN ARG. GET=RETNGET.NO;

RETN ARG. GET=RETNGET.NO;

RETN ARG. PRED. CN(1)=1;

RETN ARG. PRED. CN(1)=1;

RETN ARG. PRED. CN(1)=8;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALLOCATE RETN ARG;

LP->RETN ARG.PTR=P; LP=P;

RETN ARG.NODE=3;

RETN ARG.NODE=3;

RETN ARG.PARENT=1;

RETN ARG.GET=RETNGET.NO;

RETN ARG.GET=RETNGET.NO;

RETN ARG.GET=RETNGET.NO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALLOCATE RETN ARG;
LP->RETN ARG.PTR*P; LP*P;
RETN ARG.PSETID*KEY(KY.PENAME);
RETN ARG.NODE*4;
                                                                                                                                                                                                                                                                                                               ALLOCATE RETN ARG; RP.LP-P;
RETN ARG.PSETID=KEY(KY.PASET);
RETN_ARG.GET=RETNGET.ANY;
RETN_ARG.N=O; /*NO PREDICATE*/
                                                                                                                                                                                                                                                                                  /*RETN TREE ROOT NODE IS ASET*/
                                                                                                                                                                                                                                              RTN_CODE=0; /+INIT TO 0.K.+/
                                                                                                                                                                                                                                                                                                   / *NO PREDICATE */
                                                                                                                                                                                                                                /+BEGIN PROCESSING+/
                                                                                                                                                                                                                                                                                                                                                                                                                            I=1; /+1 PREDICATE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         I=1; /+1 PREDICATE+/
                                                                                                                                                                                                                                                                                                                                                                                                           / * ANAME NODE * /
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*ENAME NODE*/
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FILE: GAUT

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /+GET DATA AND DECODE+/
P=TP->RETN RTN.PTR->RETN RTN1.PTR; /+THE 3RD TOKEN RETURNED+/
ADDR(AINFO)->BIT_STRING=RETN_RTN1.DATA;
                                                                                                                                                                                                                                                                                                                                                                                     /*DECODE RETURN*/
IF TP->RETN_RTN.RTN_CODE^*O THEN DO;
RTN_CODE=1;/*PROBLEM IN RETRIEVAL*/
CALL SVC3 (RP);
CALL SVC3 (TP);
REIN_ARG. PARENT=3;
REIN_ARG. BSETID=KEY(KY. BENAME);
REIN_ARG. GET*REINGET.NO;
REIN_ARG. N=1; /*1 PREDICATE*/
REIN_ARG. PRED. CN(1)=1;
REIN_ARG. PRED. OP(1)=1;
REIN_ARG. PRED. OP(1)=REINOP. EQ;
REIN_ARG. PRED. ODEN(1)=8;
REIN_ARG. PRED. OATA=UNSPEC (ENAME);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF TP->RETN_RTN.N>*1 THEN DO;
RTN_CODE=2; /*NO SUCH ATTRIBUTE*/
CALL SVC3 (RP);
CALL SVC3 (TP);
                                                                                                                                                                                  ALLOCATE RETN ARG;
LP->RETN ARG.PTR=P; LP=P;
RETN ARG.PSETID=KEY(KY.PAINFO);
RETN ARG.PARENT=1;
RETN ARG.PARENT=1;
RETN ARG.GET=RETNGET.ANY;
RETN ARG.N=O; /+O PREDICATE+/
                                                                                                                                                                                                                                                                                                                                       /*CALL UP RETN*/
CALL TCALL ('RETN', 1,RP,TP);
                                                                                                                                                                     1=0; /*NO PREDICATE*/
                                                                                                                                                     /*AINFO NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RETURN;
END;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ENO:
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GAC00970 GAC00980

RETURN: CALL SVC3 (RP); CALL SVC3 (TP); RETURN; /\*RETURNS\*/

END /+GACT+/;

GBCT: PROC(BSETID, BINFO, RTN_CODE);	GBC00010
/*A SUBROUTINE WHICH ACCEPTS THE BSETID AND RETURNS A DECODED BINFO	GBC00020
*** TO THE CALLER***********************************	GBC00030
	GBC00040
XINCLUDE DBCAT,FDEBUG,DBEU;	GBC00050
XINCLUDE ESUB1:	GBC00060
DCL P PTR, (NULL, ADDR) BUILTIN, RIN_CODE FIXED BIN;	GBC00070
DCL BSETID BIT (32);	GBC00080
DCL BIT_STRING BIT (88) BASED;	<b>GBC00090</b>
	GBC00100
CALL RET1 (BSETID, P.RTN_CODE);	GBC00110
IF P*NULL THEN DO;	GBC00120
RTN_CODE=1; /***ILLEGA BSETID1****/	GBC00130
RETURN;	GBC00140
END;	GBC00150
	GBC00160
ADDR(BINFO) ->BIT_STRING=BEU.DATA;	GBC00170
FREE BEU;	GBC00180
RTN_CODE=O;	GBC00190
RETURN;	GBC00200
END:	GBC00210

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GEC00020
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                                 /***** A S-PROC IN THE ENTITY LEVEL TO OBTAIN THE ENTITY CAT. ENTRY **** OF ENTITY SET WHOSE NAME IS SPECIFIED IN ENAME; RETURNS EINFO*/
                                                                                                                          DCL RTN CODE FIXED BIN, ENAME CHAR (8);
DCL (P.TP,RP,LP) PTR, I FIXED BIN, NULL BUILTIN;
DCL INSPEC BUILTIN;
                                                                                        XINCLUDE DECAT, ARETN, DKEY, SERVICE, FDEBUG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF TP->RETN RTN. RTN CODE -= O THEN DO;
RTN CODE=1; /*PROBLEM IN RETRIEVAL*/
CALL SVC3 (RP);
CALL SVC3 (TP);
GECT : PROC (ENAME, EINFO, RTN_CODE);
                                                                                                                                                                                                                      RIN_CODE=O; /+INIT TO O.K.+/
/+ALLOCATE ROOT RETN TREE - ESET+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ALLOCATE RETN ARG:
LP->RETN ARG: PTR=P; LP=P;
RETN ARG.PSETID=KEY(KY.PEINFO);
RETN ARG.GET=RETNGET.ANY;
RETN ARG.NODE=3;
RETN ARG.NODE=3;
RETN ARG.PSETID=KEY(KY.BEINFO);
RETN_ARG.PARENT=1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETN_ARG.N=1; /+! PREDICATE+/
RETN_ARG.CN(1)=1;
RETN_ARG.OP(1)=RETNOP.EQ;
RETN_ARG.DLEN(1)=8;
RETN_ARG.DATA(1)=UNSPEC (ENAME);
                                                                                                                                                                                                                                                                                                                                                                                                   ALLOCATE RETN ARG;
LP->RETN ARG. PTR=P; LP=P;
RETN ARG. PSETID=KEY(KY. PENAME);
RETN_ARG. GET=RETNGET.NO;
RETN_ARG. NODE=2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ARG. BSETID=KEV(KY.BENAME);
ARG. PARENT=1;
ARG. N=1; /*1 PREDICATE*/
                                                                                                                                                                                                                                                                         ALLOCATE RETN ARG; LP,RP=P;
RETN ARG.PSETID=KEY(KY.PESET);
RETN ARG.GET=RETNGET.ANY;
                                                                                                                                                                                                                                                                                                                             RETN ARG. N=0; /+0 PREDICATE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETN_ARG.N*O; /+O PREDICATE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CALL TCALL ('RETN', 1,RP,TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*NEXT MODE -- EINFO **/
                                                                                                                                                                                                                                                                                                                                                                     /*NEXT NODE -- ENAME**/
                                                                                                                                                                                                                                                          I = 0; / *NO PREDICATE */
                                                                                                                                                                                                                                                                                                                                                                                      =1: /*NO PREDICATE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1=0; /*NO PREDICATE*/
                                                                                                                                                                                                    / *BEGIN PROCESSING * /
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /+CHECK RETURNS+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /+CALL UP RETN+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETN
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**~** 

PL10PT

FILE: GECT

GMEM: PROC(NUM\_BYTES, ID);

FILE: GPCT

XINCLUDE DPCAT, FDEBUG, DBEU;
XRNCLUDE ESUB!;
DCL P PTR, (MULL, ADDR) BUILTIN, RTN\_CODE FIXED BIN;
DCL PSETID BIT (32);
DCL BIT\_STRING BIT (144) BASED;

CALL RET! (PSETID, P.RIN\_CODE);
IF P=NULL THEN DO;
RIN\_CODE=1; /++\*ILLEGA PSETID --!+++++/
RETURN;
END;

ADDR(PINFD)->BIT\_STRING\*BEU.DATA; FREE BEU; RTN\_CODE\*O; RETÜRN; END;

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GSE00320
GSE00330
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GSE00120
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                                                                                                                                                                                                      •
                                                                                                                                                                                                                                                                                                                                                                                                                                      /* ESTABLISH THE REST OF SEU */
/* L = # OF PACKETS IN THIS SEU -1 */
/* GET ALL PACKETS */
                         /* OBTAIN FIRST 8 BYTES OF THIS SEU
/* IMPOSE SEU STRUCTURE ON DATA */
/* IF ATTEMPT TO RETRIEVE INVAL SEU
                                                                                                                                                                                                                                                                                                              /* ESTABLISH FIRST 8 BYTES OF SEU */
                                                                                                      DCL DATA CHAR(B), VA FIXED BIN(31), TP PTR, DT5 CHAR(5); DCL (I.RTN CODE,L.L1,L2) FIXED BIN, ID BIT (32); DCL (NULL,ADDR,SUBSTR,UNSPEC,MIN) BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DO I, = 1 TO L; /* GET CALL PAKT (VA+I*8,DATA,'R'); L1 = I*8-2; L2 = MIN(8,SEU.N-L1+1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SUBSTR (SEU.DATA, L1, L2) - DATA;
GSEU: PROC (1D, SEUPTR, RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DATA - SUBSTR (DATA, 1, L2);
                                                                                                                                                                                  UNSPEC(VA) = ID;
CALL PAKT (VA,DATA,'R');
SEUPTR = ADDR (DATA);
IF SEU.INVAL ^= 'N' THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                           DTS = SUBSTR(DATA,1,L);
SUBSTR(SEU.DATA,1,L) = DT5;
                                                                                                                                                                                                                                                                                                                                              TP -> SEU. INVAL = SEU. INVAL;
                                                                                                                                                                                                                                                                                                                                                                                            DATA - SUBSTR(DATA, 4, L);
                                                                                           XINCLUDE DSEU1, EPAKT;
                                                                                                                                                                                                                                                                                                                  I * SEU.N;
ALLOC SEU SET (TP);
                                                                                                                                                                                                                                                                                                                                                                              - MIN (5, SEU.N);
                                                                                                                                                                                                                                                                                                                                                                                                                                                           * (SEU.N + 2)/8;
                                                                                                                                                                                                                                                    RTN_CODE = 1;
RETURN;
                                                                                                                                                                         RTN CODE * 0;
                                                                                                                                                                                                                                                                                                                                                              SEUPTR - TP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RETURN:
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FILE: LEX

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LEX00030
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                                                                                 MODE: IF SET INDICATES THAT BLANKS ARE TO BE SUPPRESSED.
                                                                                                                                                                                                                                                                                                                                                                                                   <del>^</del>
                                                                                            PURPOSE: THIS IS THE LEXICAL ANALYZER WHICH PARSES AN INPUT
LINE INTO TOKENS. TOKEN DELIMITERS ARE ',' AND ':'.
DELIMITERS IN QUOTES ARE NOT TREATED AS EXCEPTIONS.
MORE THAN 1 LINE OF INPUT CAN BE STRUNG TOGETHER BY
ENDING PREVIOUS LINES IN BACK SLASH.
BLANKS CAN BE OPTIONALLY SUPPRESSED. BLANKS ENCLOSED IN
                                                                                                                                                                                                                                                                                                               TOKEN: AN ARRAY CONTAINING THE TOKENS (CHAR$ UP TO 40 CHAR'S) AND LENGTH OF TOKENS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LAST FIXED BIN(15), LAST1 FIXED BIN;
DCL MODE FIXED BIN; /+1*SUPPRESS ALL BLANKS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DCL (VERIFY, SUBSTR, INDEX, LENGTH) BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    STR = STR | SUBSTR(LINE, 1, POS-1);
GO TO LOOP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /* INPUT STRING VARIABLES */
DCL (STR1,STR2,STR) CHAR(240) VARYING
LINE CHAR(80),
                                                                                                                                                                                                                                                                                                                                                                                     1 - EXCESSIVE SEPARATORS
                                                 DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                  - UNBALANCED QUOTES
                                                                                                                                                                                                                                                                                                                                                                                                                                    / + LEXICAL ANALYZER VARIABLES */
LEX: PROC (1, TOKEN, MODE, RTN CODE);
                                                                                                                                                                                                 QUOTES ARE NOT SUPPRESSED.
                                                                                                                                                                                                                                                                                                                                                                                                                                                  DCL 1 TOKEN (25),
2 D CHAR(40),
2 L FIXED BIN;
DCL RTN_CODE FIXED BIN;
DCL I FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GET EDIT (LINE) (A(80));
POS = INDEX(LINE,'/');
IF POS ^= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       POS FIXED BIN(15);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      / GET INPUT STRING +/
                                                                                                                                                                                                                                                                                                  I: NUMBER OF TOKENS
                                                                                                                                                                                                                                                                                                                                                    RTN CODE: 0 - 0.K.
                                                 MODULE
                                                                                                                                                                                                                                                                                  OUTPUT PARAMETERS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      = STR | LINE;
                                                                                                                                                                                                                                  INPUT PARAMETERS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /* START SUBROUTINE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RTN_CODE=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      STR = "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         THEN DO:
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                                                                                                                                                                                                                                                                                                                                                                                                                    •
                                                                                                                                                                                                                                                                                                                                                                                                                  /* DO TILL END OF STRING * /* LODKING FOR DELIMITER */
/* FIX UP LINE */
DO I = LENGTH(STR) TO 1 BY -1 WHILE(SUBSTR(STR.I.1) = ' ');
                                                                                                                                                                                                                                                                                                                                                                                                                 /*SKIP BLANKS IN QUÖTES*/
IF SUBSTR(STR,1,1)='''' THEN DO WHILE ('1'8);
                                                                                                                                                                                                 IF SUBSTR(STR, I, 1)='''' THEN LEAVE;
                                                                                                                                                            RTN CODE=2; /*ILLEGAL SYNTAX RETÜRN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ELSE IF LAST < 0 THEN LAST = LAST1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THEN DO; /* MISUSE OF DELIMITER */
                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                I = I + 1;
TOKEN.D(I) = SUBSTR(STR.1,LAST);
TOKEN.L(I) = LAST;
                                                                                                                                                                                                                                                     IF SUBSTR(STR,1,1)=' THEN
STR1=SUBSTR(STR,1,1-1);
STR2=SUBSTR(STR,1+1);
STR=STR1||STR2;
                                                                                                                                                 IF I>LENGTH(STR) THEN DO;
                                     STR = SUBSTR(STR, 1,1) } ; '..';
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        STR = SUBSTR(STR, LAST+2);
                                                                              IF MODE=1 THEN DO;
DO 1=1 TO LENGTH(STR);
                                                                                                                                                                                                                                                                                                            I=I-1; /+FIX UP I+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RTN CODE = 1;
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                      /* EXTRACT TOKENS */
DO WHILE(VERIFY(STR,
                                                                 /*SUPPRESS BLANKS*/
                                                                                                                                                                                                                                                                                                                                                                              /+ LEX STARTS +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IF LAST = 0.
                                                                                                                                    [=]+1:
                                                                                                                                                                                                                  ENO.:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /+LEX+/;
                                                                                                                                                                                                                                                                                                                          END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ENO:
                                                                                                                                                                                                                                             ELSE
                                                                                                                                                                                                                                                                                                                                      END:
                                                                                                                                                                                                                                                                                                                                                                                           0
                          ENO:
                                                                                                                                                                                                                                                                                                                                                    EKO:
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LEXT:	PROC(N.TOKEN,T1,TN,PRED,MOP,RTN CODE);	LEX00010
*****/	*******	LEX00020
. •	•	LEX00030
•		LEX00040
* * * * * * *	/**************************************	LEX00050
/		LEX00060
***	PURPOSE	LEX000/0
-5	S-PROG AT THE USEK INTERFACE LEVEL WHICH ACCEPTS TOKENS THE MATORY AND IDENTIFIED THE IDEE SIDDICATOR AND THE DOEDICATE	LEXCOORD FXOODRO
	A MAINTA AND IDENTIFIES THE STRUCTURE AND THE TREUTER. INC. THE STRUCTURE AND THE TREUTER.	1 FX00 100
	VALUES IN THESE TONENS; IT ALSO DISCENS MODIFICATION OFFINAL OF SALICE OF A STRONG THE MANDE AND STORE THEM IN STRUCTURE HAD A /	Ex00110
	•	FX00120
		EXO0130
		EX00130
	THE HIEDADCHICAL STDUCTURE OF NAMES IS IDENTIFIED BY	LEXO0150
	NESTED PARANTHESES. FOR EXAMPLE IF TOKEN (1) IS 'ABC('.	LEX00160
•	TOKEN(2) IS 'DEF' AND TOKEN(3) IS 'GHI)', THEN DEF AND GHI	LEX00170
* * * * *	HAVE ABC AS THEIR PARENT NAME.	LEX00180
* * * * *	THERE ARE TWO TYPES OF NON-NAME TOKENS: MODIFICATION OPERATOR	LEX00190
* * * * *	(MOP) AND PREDICATE TOKEN. MOP IS DISTINGUISHED FROM REGULAR	LEX00200
* * * * *	NAME TOKENS BY ITS SPECIAL STARTING CHAR '-'. TOKEN THAT	LEX00210
* * * * * *	CONTAIN SPECIAL COPARISON OPERATORS ('*', '<',') IS TAKEN	LEX00220
* * *	AS PREDICATE TOKEN AND IS BROKEN INTO A NAME TOKEN AND A	LEX00230
* .	VALUE TOKEN.	LEX00240
* * * * * * * * * * * * * * * * * * * *		LEX00250
	***************************************	LEXO0260
***	N. AMMERICANS. N. AMMERICANS IN THE TOKEN ARRAY	LEXO0280
* * * * *	TOKEN: TOKEN ARRAY	LEX00290
*****	*************	LEX00300
• • • • •		LEX00310
****	TI: AN ARRAY DESCRIBING THE HIERARCHICAL STRUCTURE OF	LEX00320
* * * * *	NAME TOKENS. ROOT NAMES HAVE PARENT = 0 WHILE	LEX00330
****	NON-ROOT NAMES HAVE A PARENT EQUAL TO THE INDEX	LEX00340
* * * * *	OF THE PARENT IN T1.	LEX00350
* * * * *	TN: NUMBER OF NAMES IN T1.	LEX00360
	FRED: AN ARKAY USED SIGNE PREDICALE UP. VALUE	LEXO0370
	LENGIH IDENIIFIED FOR CORRESPONDING NAME IN 11.	LEXO0380
	AN ARRAT USED TO UMBUCATE MUDIFICATION OF	LEXO0390
	RIN CODE: 0 - 0.K.	LEX00410
• • • • • • • • • • • • • • • • • • • •		LEX00420
* * * * *	3: ILLEGAL MODIFICATION OPERATOR	LEX00430
****	<u></u>	LEX00440
		LEX00450
Š	A TH DIN CODE T - WEIVED DIN.	LEX00460
ב ב	(N, IN, KIN_CODE, I, U, K) FIXED BIN;	LEX00470
DOC	1 T1 (25), /* ENTITY AND ATTRIBUTE NAMES TREE STRUCTURE*/	LEX00490
	2 PARENT FIXED BIN,	LEX00500
	:(8):	LEX00510
DCF	DL.	LEX00520
	2 UP CHAR (1), 2 VALUE CHAR (40)	LEX00540
	2 VLEN FIXED BIN;	LEX00550

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /*MISMATCH OF PARENTH*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  STR NOT EMPTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /+ MISMATCH OF PARENTH +/
                                                                                                                                                                                                                                                DO 1=1 TO N; /*N IS NUMBER OF TOKEN*/
STR=SUBSTR(TOKEN.D(I),1,TOKEN.L(I)); /* EXTRACT TOKEN */
DCL MOP (25) CHAR (1), CURRENT MOP CHAR (1) INIT ('X'); /+ INIT TO 'DON'T KNOW' +/
                                                                                                                                                                                                                                                                                                                                                                        CALL TIP(K); /* PROCESS UP TO '(' */
IF RIN_CODE ^= O THEN RETURN; /* SET BY TIP */
STP=STP+1; /*PUSH STACK*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /* RECYCLE IF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ELSE CALL TIP(K):/* PROCESS ENTIRE STRING
IF RTN_CODE ^* O THEN RETURN;
                                                                                                                                                                                                                                                                                             LOOP: /* FOR EACH TOKEN PERFORM THIS LOOP */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL T1P(K);/* PROCESS UP TO ')'
IF RTN_CODE ^* O THEN RETURN;
                                             DCL 1 TOKEN (25),
2 D CHAR(40),
2 L FIXED BIN;
DCL ST(25) FIXED BIN, STP FIXED BIN;
DCL (STR,DATA) CHAR(40) VARYING;
DCL (SUBSTR,INDEX,LENGTH) BUILTIN;
                                                                                                                                                                                                     TN=0; /*INIT T1 COUNT TO O*/
STP=1; ST(STP)=0; /*INIT STACK*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    STR . * ' THEN GO TO LOOP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          END /* RTN_CODE */:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF STP=0 THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IF STP-=1 THEN RTN_CUDE=2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RTN CODE=1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  K=1NDEX(STR,')');
                                                                                                                                                        /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               STP=STP-1;
                                                                                                                                                                                                                                                                                                                              K-INDEX(STR.'(');
                                                                                                                                                                                                                                                                                                                                                                                                                                     END /* '(' */
                                                                                                                                                                                                                                                                                                                                                                                                                       ST(STP)=TN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IF K^=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END:
                                                                                                                                                                                        RIN CODE=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ELSE DO:
                                                                                                                                                                                                                                                                                                                                                           THEN DO:
                                                                                                                                                                                                                                                                                                                                              IF K^=0
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FILE: LEXT

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             If K^=0 THEN DD ;/* OP FOUND, PROCESS VALUE BY BREAKING TOKEN INTO
TWO: VALUE AND NAME DATA */
PRED.OP(TN)=SUBSTR(DATA,K,1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SUBSTR(VALUE, 1, 1)='''' THEN DO: /*TAKE QUOTES OUT */
END=LENGTH(VALUE)-2;
VALUE=SUBSTR(VALUE, 2, END);
                                                                                                                                                                                                                                                                                                                                                                                                                                   SELECT (CMD);
WHEN ('ID') CURRENT MOP"'I';
WHEN ('INSERT', 'INS', 'IST') CURRENT MOP"'N';
WHEN ('REPLACE', 'REP', 'R') CURRENT MOP"'R';
WHEN ('DELETE', 'DEL', 'D') CURRENT MOP"'B';
OTHERWISE RIN_CODE = 3; /* ILLEGAL SYNTAX */
                               DCL DP(3) CHAR (1) INIT ('>','<','*');
DCL VALUE CHAR (40) VARYING; DCL CMD CHAR (8);
                                                                                                                                                                                                                                                                                                                                         SEE IF TOKEN IS MODIFICATION OPERATORS */
 PROC(K); /+INTERNAL SUBROUTINE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RETURN; /* FINISHED THIS TOKEN */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TN=TN+1;

DO J=1 TO 3; /* CHECK FOR VALUE */

K=INDEX(DATA,OP(J));

IF K^=O THEN LEAVE; /* FOUND */
                                                                                                                                                                                                                                                                                                                                        /* SEE IF TOKEN IS MODIFICATION OP
K=INDEX(DATA, '-');
IF K = 1 THEN DO ; /* IT IS A MOP
                                                                                                                              STR = SUBSTR(STR, K+1); RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /+ PROCESS DATA - NOT A MOP +/
                                                                                                               /*ND DATA*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DATA=SUBSTR(DATA, 1,K-1);
                                                                                                                                                                                           DATA=SUBSTR(STR,1,K-1);
STR=SUBSTR(STR,K+1);
                                                                                                                                                                                                                                                                                                                                                                                      DATA . SUBSTR (DATA,2);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VALUE -SUBSTR(DATA,K+1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    END /* SELECT */;
                                                               DCL END FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   END /* MOP */;
                 DCL K FIXED BIN;
                                                                                                                                                                             K>1 THEN DO;
                                                                                                                                                                                                                                                            K=0 THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                       CMD = DATA;
                                                                                                                                                                                                                                                                          DATA=STR:
                                                                                                                                                                                                                                                                                         STR= ' ';
                                                                                                               THEN DO:
                                                                                                                                                                                                                             ENO:
                                                                                                                                               END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END:
                                                                                                                                                                                                                                                                                                           END
                                                                                               1F K=1
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FILE: LEXT PLIOPT A1	VM/SP CONVERSATIONAL MONITOR SYSTEM	SYSTEM
!!		0994049
		LEX01670
ELSE VALUE='':		LEX01680
		LEX01690
PRED. VALUE(TN) *VALUE:		LEX01700
PRED VLEN(TN)=LENGTH(VALUE):	<i>-</i>	LEX01710
		LEX01720
/* REGISTER NAME*/		LEX01730
T 1 ANAME ( IN ) = DATA:		LEX01740
T1. PARENT (TN) = ST (STP);		LEX01750
MOP(TN) = CURRENT MOP:		LEX01760
PETURN:		LEX01770
		LEX01780
END /+T1P+/:		LEX01790
******		LEX01800
•		LEX01810
FMD /at EXTs/.		LEX01820

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PLIOPT

FILE: MINIT

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MIN00020
                                    MIN00030
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                                                                                                                                                                                                                                               NOT CONTAIN ANY DATA YET), THEN AVAIL LOC WHICH INDI-
CATES THE STARTING LOCATION OF FREE VIRTUAL MEMORY AND +
IS STORED AT THE FIRST PACKET OF SH IS INITIALZED TO +
BE 16 BY CALLING SUBROUTIN PAKT.
IF IT IS INIT REQUEST AND IT IS FILE INIT (I.E., SH AL-+
READY EXISTS WITH DATA) THE KEY FOR THE UPPER LEVEL+
(4 BYTES) IS READ IN FROM VIRTUAL MEMORY LOCATION 5 +
AND THEN GIVEN TO THE UPPER LEVEL+
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •• A T-PROC AT THE MM LEVEL WHICH INITIALIZES THIS LEVEL AND OBTAINS•
•• THE KEY FOR THE UPPER LEVEL IF DATA ALREADY EXISTS IN SH.
•• (FOR INTEGRATED VERSION: MAKE USE OF SUBROUTINE PAKT)
                                    1. IF IT IS INIT REQUEST AND IT IS NEW INIT (I.E., SH DOES*
                                                                                                                                                                                            *********************************
                                                                          CALL PAKT (O,DATA,'R'); /* GET FIRST PACKET IN THE SH */
DT4 = SUBSTR(DATA,5.4); /* GET THE 2ND HALF OF THE PACKET */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    UNSPEC(DT4) = UNSPEC(BIN(16,31));
SUBSTR(DATA,1,4) = DT4;
GO-18-R**
                                                                                                                                                                                                                                                                                                                                                                                                      IT IS STORE KEY REQUEST THEN THE KEY IS STORED AT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DCL KEY BIT (32);
DCL (P.RIP) PTR. (NAME.DATA) CHAR (8). OP CHAR (1), DT4 CHAR(4);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  INPUT PARAMETERS: AS INDICATED BY AMINIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /* FILE INIT */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MINCLUDE DSEU1, EPAKT, SERVICE, FDEBUG, AMINI
                                                        MODULE DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF NAME=(8)' ' THEN DO; /+NEW INIT+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (NULL, BIN, UNSPEC, SUSBSTR) BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL TBEG ( PROC_ADDR, P);
ALLOCATE MINIT_RTN SET (RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SELECT (OP);
WHEN ('I') DO; /*INIT**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME=MINIT_ARG. FNAME
                                                                                               PURPOSE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                OP-MINIT ARG. OF:
                                                                                                                                                                                                              METHOD:
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MINIT: PROC
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MINOO580
MINOO590
MINOO500
MINOO620
MINOO630
MINOO660
MINOO600
MINOO700
MINOO730
MINOO730
 MIN00560
MIN00570
                                                                                          WHEN ('S') DO: /*PROCESS STORE KEY REQUEST*/
CALL PAKT (O.DATA,'R'); /* GET 1ST PACKET IN THE SH */
UNSPEC(DT4) = MINIT ARG.KEY;
SUBSTR(DATA,5.4) = DT4; /* UPDATE IT WITH KEY */
CALL PAKT (O.DATA,'W');
END /*WHEN S*/;
/* GET KEY */
                                                                                                                                                                                      END /*SELECT */;
RIN: CALL TRIN( PROC_ADDR,RIP);
KEY = UNSPEC (DT4);
RTP->MINIT_RIN.KEY=KEY;
40-40-RIN;
END;
                                                                  END /*WHEN 1*/;
                                                                                                                                                                                                                              RETURN;
END /*MINIT*/;
```

FILE: MODN

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M0D00110
M0D00120
M0D00130
                                                                                                                                                                                                                                                              MODOO 140
MODOO 150
MODOO 160
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M0000240
M0000250
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M0D00180
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M0D00360
                 M0D00020
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                                                                                                                                                         DCL (MP.P) PTR, (N.RTN_CODE) FIXED BIN,
OFF_NODE(25) BIT (1) CONNECTED,
DATA BIT (320) VARYING, (PS.ID.8S) BIT (32), (SUBSTR,NULL)BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WHEN (UPDNOP.IST) CALL CRTB(PS,BS,ID,DATA,'A',RTN_CODE);
WHEN(UPDNOP.CI) CALL CRTB (PS,BS,ID,DATA,'N',RTN_CODE);
WHEN (UPDNOP.DE) CALL DELB (PS,BS,ID,'A',RTN_CODE);
WHEN (UPDNOP.REP)
CALL REPB (PS,BS,ID,'N',RTN_CODE);
WHEN (UPDNOP.REPP)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    END /+MODN+/; /+RIN_CODE IS SET TO RIN FROM SUBROUTINE CALLS+/
                                      /*A S-PROC AT THE N-ARY LEVEL USED AS A SUBROUTINE CALLED BY *UPDN PROGRAM TO PERFORM MOD OP AT ROOT NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                        /*FOLLOW THE TREE*/
DO P-UPDN ARG.PTR REPEAT UPDN ARG.PTR WHILE (P^=NULL);
IF OFF_NODE(UPDN ARG.NODE)='0'8 THEN DO;
BS=UPDN ARG.BSETID;
DATA=SUBSTR(UPDN ARG.DATA,1,UPDN_ARG.DLEN * B);
SELECT (UPDN_ARG.DP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL REPB (PS.BS.ID.DATA, 'N', RTN_CODE);
                                                                                                                                                                                                                                            /+DO P=MP REPEAT UPDN_ARG.PTR WHILE(P^=NULL); PUT SKIP LIST('MGON ARG LIST', UPDN_ARG); END;
                                                                                                                                                                                                                                                                                                                                            PS=UPDN ARG.PSETID;
DATA=SUBSTR(UPDN ARG.DATA,1,UPDN_ARG.DLEN * 8);
CALL SRCH(PS.DATA,1D,RTN_CODE);
MODN: PROC(MP,OFF_NODE,RIN_CODE);
                                                                                                                      XINCLUDE ECRTB, EDELB, EREPB, ESRCH;
                                                                                                                                                                                                                                                                                                                              /*LOCATE ROOT NODE ID*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          END /*SELECT*/;
END /*DO 1F*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /+DO+/;
                                                                                                   XINCLUDE AUPON;
```

MPST: PROC(MAP, POS);

```
MP 5000 10
MP 500020
MP 500030
MP 500040
MP 500050
MP 500060
MP 500010
MP 500 120
MP 500 130
MP 500 140
                               /+S-PROC AT THE N-ARY LEVEL USED BY DEFP AND DEFB FOR ASSIGNING +1D SLOTS IN THE 1D ARRAY+++++/
                                                                            DCL MAP BIT (32), (POS.I) FIXED BIN;
DCL SUBSTR BUILTIN;
                                                                                                                      DO I=32 TO 1 BY -1;
IF SUBSTR(MAP,I,1)='0'B THEN DO;
SUBSTR(MAP,I,1)='1'B;
POS=1;
RETURN;
END;
                                                                                                                                                                                                                  END;
POS*O; /*NOT AVAILABLE*/
RETURN;
END /*MPST*/;
```

PINFO.MAP=MAP;

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2
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NINOO580
NINOO590
NINOO610
NINOO610
NINOO620
NINOO670
NINOO720
NINOO720
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NINOO730
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NINOO730
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NINOOB 10
NINOOB 20
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NINOOB40
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NINO 1050
  NIN00570
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                                                                                                                                                                                                                                                                                                                                                                                    NKEY(3)=UNSPEC (MULL); /*RESERVED*/
I=1; J=96; ALLOCATE BEU;
BEU.DATA=STRING(NKEY);
CALL CRT1(AKEY,P,RTN_CODE); /*OBTAINS ANCHOR KEY(AKEY)*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NKEY(3)*NINIT_ARG.KEY;
I=1; J=96; ALLOCATE BEU.BEU.DATA=STRING(NKEY);
IF AKEY^*UNSPEC (NULL) THEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /+STORE KEY BY CALLING MINIT+/
ALLOCATE MINIT ARG:
MINIT ARG.OP='S'; MINIT ARG.KEY=AKEY;
CALL TCALL ('MINIT', 1.P.TP);
/*STREAMLINE PINFO INTO BIT STRING*/
/*CREATE THIS PCAT CAT ENTRY***/
I=4; /*4 IDS*/
                                                                          BEU.DATA=ADDR(PINFO)->BIT_STRING;
CALL_CRT1 (ID.P, RTN_CODE);
                                                                                                                                                     /*INITIALIZE BCAT AS A PSET*/
ALLOCATE DEFP ARG SET (TP);
TP->DEFP ARG.PTYPE='8';
TP->DEFP ARG.PLEN='11;
TP->DEFP ARG.IMP.HOW=DEFPHOW.SA;
TP->DEFP ARG.IMP.HOW=DEFPHOW.SA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALL REP1(AKEY, P.RTN_CODE);
ELSE CALL CRT1(AKEY, P.RTN_CODE);
                                                                                                                                                                                                                                                                CALL TCALL ('DEFP', 1, TP,TP');
BCATID*TP1->DEFP_RTN.PSETID;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    END /+WHEN'I'+/;
WHEN ('S') DO; /+'S' OP FOR NINIT+/
NKEY(1)=PCATID;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL SVC3 (P);
CALL SVC3 (TP);
CALL TRIN (PROC_ADDR, RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL TRTN(PROC_ADDR, RTP);
END /*WHEN 'S'*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /+NEW INIT+/:
                                                                                                                                                                                                                                                                                             CALL SVC3 (TP);
CALL SVC3 (TP1);
                                                                                                                                                                                                                                                                                                                                                           NKEY(1)-PCATID:
                                                                                                                                                                                                                                                                                                                                                                         NKEY(2) -BCATID:
                                                               ALLOCATE BEU;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NKEY(2)=BCATID;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /*RETURNS**/
                                                                                                         PCATID=ID:
                                                                                                                           FREE BEU:
                                                 J= 18 +8;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FREE BEU;
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NINO1110 NINO1120 NINO1130 NINO1140

FILE: NINIT

END /\*SELECT\*/;

END /\*NINIT\*/;

FILE: PAKT

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PAK00020
                                  PAK00030
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                                                                                                                                                                                                                                                                                         *
                                                                         ••• IT INTERFACES DIRECTLY WITH THE DSH STV •••••••••••••••
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /.................... IIWING REPORT OPTION .................
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /* PREPARE ARG TO COMM. WITH JSH
             *** THIS IS A SUBROUTINE AT THE WM LEVEL WHICH RETRIEVES AN 8-BYTE *** PACKET ("ATA) GIVEN ITS VIRTUAL ADDRESS (VA) IF RW IS 'R', OR *** WRITES AN 8-BYTE PACKET GIVEN ITS VA IF RW IS 'W' ****
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FREE LOTIME: IF ALLOCATION(LOTIME)^= O THEN LOTIME=LOTIME+BEGTIME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /* FIIME IS TIMING REPORT OPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /+ PREPARE FOR SEND PROTOCOL +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (BEGIME.ENLM.LOTIME CTL) FIXED BIN(31);
RTIMER ENTRY RETURNS(FIXED BIN(31));
(E-OUNT(50).ELD(50),ETIME(50)) FIXED BIN(31) EXT INIT((50)0);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ENUM = 19;

FILE IS THE 19TH PROC NAME TO BE TRACED ETIME(ENUM) = ETIME(ENUM) + BEGTIME; / * ACCUMULATE TOTAL TIME */
ECOUNT(ENUM) = ECOUNT(ENUM) + 1; / * ACCUMULATE COUNT */
ELO(ENUM) = ELO(ENUM) + LOTIME; / * ACCUMULATE LOWER LEVEL PROC TIME *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /* DBTAIN RETURN ARG */
                                                                                                                                                                                                                                               DCL VA FIXED BIN(31), DATA CHAR(8), RW CHAR(1);
                                                                                                                                                                                                                                                                                                                                                                    IF RW . 'R' THEN ARG. REQ_TYPE . 'READ';
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IF RW . 'R' THEN DATA . ARG.DATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL SEND (1,0,1,'S',20,PT_SVC);
                                                                                                                                                                                                                                  KINCLUDE USERS, VPX, PFSVC, ARG;
                                                                                                                                                                                                                                                                                                           ARG. VIRTUAL_ADDRESS = VA;
ARG. VPID = THISVP->VP. VPID;
                                                                                                                                                                                                                                                                                                                                                                                                        ARG. REQ TYPE = 'WRITE';
ARG. DATA = DATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ALLOCATE LOTIME: LOTIME=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BEGTIME = RTIMER-BEGTIME;
PAKT : PROC (VA , DATA , RW);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ARGPIR - VP. WAIT. MSG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FTIME BIT(1) EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALLOE PF_SVC;
PF_SVC.SVC = 'L1';
PF_SVC.PTR = ARGPTR;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF FIIME THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF FTIME THEN DO:
                                                                                                                                                                                                                                                                                         J-8: ALLOC ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      BEGTIME -RTIMER
                                                                                                                                                                                                                                                                                                                                                 ARG BOXID = 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL WAIT(1);
                                                                                                                                                                                                                                                                                                                                                                                       ELSE DO:
                                                                                                               ***/
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PLIOPT A1

FILE: PAKT

RETURN; END;

PRN00020 PRN00030 PRN00040 PRN00050 PRN00060 PRN00070 PRN00080 PRN00090 PRN00100 PRN00110 PRN00120 PRN00130 PRN00140 PRN00150 PRN00160 PRN00170 PRN00180 PRN00190 PRN00200 PRN00210 PRN00220 PRN00230 PRN00240 PRN00250 PRN00260 PRN00270 PRN00290 PRN00300 PRN00310 PRN00320 PRN00330 PRN00340 PRN00360 PRN00370 PRN00380 PRN00390 PRN00400 PRN00410

```
* S-PROC AT THE USER INTERFACE LEVEL, CALLED BY DMO. THIS MODULE WILL FORMAT OUTPUT OF A RETE CALL. IT IS PASSED A POINTER POINTING TO THE RETE_ARG CHAIN AND A POINTER POINTING TO THE RETE_RTN CHAIN */
PRNT: PROC (P1, P2, RTN_CODE);
```

```
%INCLUDE ARETE;
DCL 1 T(25), /* TEMP STRUCTURE */
2 NAME CHAR (8) INIT ((25) (8)' '),
                                                                        2 PARENT FIXED BIN INIT((25)0),
2 MLEN FIXED BIN,
                                                                                                                                POS, 2 LINE) FIXED BIN (31);
```

```
TOKEN CHAR (20) VARYING;
STR (4) CHAR (80) VARYING;
(I.J.K.L.CURRENT PARENT, LAST, SUM, NN. 11, 12, 13) FIXED BIN (31);
RTN_CODE FIXED BIN;
(P1,P2,P) PTR, (NULL, SUBSTR, MAX) BUILTIN;
HEADER(2) CHAR (80) VARYING;
                                      22222
```

ST (10) FIXED BIN, STP FIXED BIN NODE FIXED BIN;

## /\* BEGIN \*/

```
PUT SKIP LIST ('ENTITY SET NAME', PI->RETE_ARG.NAME);
```

```
DO P=PI REPEAT RETE_ARG.PTR WHILE (P~=NULL);
NN=RETE_ARG.NODE; /* NN IS BOTH INDEX TO T AND NODE
T.NAME(FN) = RETE_ARG.NAME;
T.PARENT(NN) = RETE_ARG.PARENT;
/*BUILD I STRUCTURE */
```

PRN00280

I MLEN(NN) -RETE\_RTN1.DLEN; /\*NOTE IN CURRENT VERSION, MLEN DLEN OF A DATA ELEMENT IS THE SAME +/ P\*P2->RETE\_RIN.PTR REPEAT RETE\_RIN1.PTR WHILE (P^=NULL); NN-RETE RTN1. NODE; 8

PRN00350

⋖

PRN00420 PRN00430 PRN00440 PRN00450 PRN00460 PRN00470 PRN00480 PRN00490 PRN00500 PRN00510 PRN00520 PRN00530 PRN00540

```
IF I NAME (J) - (B) . THEN DO:
                                    / · HE ADE R ·/
ENO.
```

```
HEADER(1)***; HEADER(2) * **; LAST*99; STP*1; ST(STP) *1; L*1;
Do J*2 to 25;
                                                                                                                                                                                                                                            WHEN (ST(STP)) TOKEN = TOKEN | ' | ' | T. NAME (J);
                                                                                                                                                                                                                                                                                                 DO WHILE (ST(STP) -= T.PARENT(J));
                                                                                                                                              TOKEN . TOKEN . ( . . T. NAME ( . ) ;
                                                                                                                                                                                               ST(STP) - T. PARENT(J);
                                                                                             SELECT (T.PARENT(J));
WHEN (LAST) DO;
                                                                                                                                                                          STP . STP +1;
                                                                                                                                                                                                                                                                                                                             TP*STP-1;
                                                                                                                                                                                                                                                                            OTHERWISE DO;
                                                                              10Kc * * '.'
```

TOKEN . TOKEN! ')'

```
FILE: PRNI
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PRN00640
PRN00650
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PRN01050
                                         PRN00590
                                                      PRN00600
                                                                   PRN00610
                                                                                                                                      PRN00660
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DO P=P2->RETE_RIN.PTR->RETE_RIN1.PTR REPEAT RETE_RIN1.PTR WHILE
                                                                                                                                                                END /*DO J */;
DO WHILE (STP ^= 1); /* FIX UP LAST TOKEN */
                                                                  IF LENGTH(HEADER(L))+LENGTH(TOKEN) > 80
TOKEN = TOKEN ! ' ! ! T. NAME (J);
                                                                                                                                    ELSE HEADER(L) * HEADER(L);|TOKEN;
END /* IF */;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PUT SKIP LIST (STR(I));
STR(I)=(100)' ';
                                                                                                                                                                                                                                                                                                                              SUM=3; L=1;
DO J=2 TO 25;
IF T.NAME(J)^=(8)' ' THEN DO;
                                                                                                                                                                                                      HEADER(L) = HEADER(L) | '';
                                                                                                                                                                                                                              HEADER(L) = HEADER(L) | | ';
DO I = 1 TO L;
PUT SKIP LIST (MEADER(I));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SUBSTR(STR(1), 1, 3)=' ; ;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /* PRINT DATA */
DO I = 1 TO L; /* INIT STR */
                                                                                                                                                                                                                                                                                                                                                                                    SUM=SUM+T.MLEN(J)+3;
IF SUM > 80 THEN DD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SUBSTR(STR(1),1,3)=' | ';
                                                                                               L = L + 1;
HEADER(L)= TOKEN;
                             END /* SELECT */;
                                                                                                                                                                                                                                                                                                                                                                                                                           T.POS(J)=1;
SUM=T.MLEN(J)+1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (P^=NUL);
NODE=RETE_RTN1.NODE;
IF NODE=1
                                                                                                                                                                                                                                                                                                                                                                       T. POS(J)=SUM+1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               STR(I)*(100)' ';
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DO I = 1 TO L;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  T.LINE(J)=L;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            END /+DO J +/;
                                                                                                                                                                                           STP=STP-1;
                                                                                                                                                                                                                                                                                                                                                                                                                L=L+1;
                                                                                   THEN DO:
                                                                                                                            22
                                                                                                                                                                                                                                                                                                                   /* DATA */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THEN DO:
                                                                                                                                                                                                                                                                                         PUT SKIP;
```

PL 10PT

FILE: PRNT

```
PRNO 1110
PRNO 1120
PRNO 1120
PRNO 1140
PRNO 1150
PRNO 1160
PRNO 1160
PRNO 1190
PRNO 1200
PRNO 1220
PRNO 1220
PRNO 1230
PRNO 1230
                                                                                                    END;
/* DO P */;
DO I= 1 TO L; /*WRITE OUT THE LAST OCCURRENCE */
PUT SKIP LIST (STR(I));
ELSE IF RETE_RTN1.DLEN ^= 0

THEN DO:

11=T.LINE(NODE);

12=T.POS(NODE);

13=T.MLEN(NODE);

13=T.MLEN(NODE);

SUBSTR(STR(I1), 12, 13)

SUBSTR(STR(I1), 12+13, 3) = ' | ';
                                                                                                                                                                                  END /* PRNT */;
    ELSE
                                                                                                                    EZ
S
```

PSE00010 PSE00020

PSEU: PROC (ID, SEUPTR, RTN\_CODE);

```
PSE00100
PSE00110
PSE00130
PSE00130
PSE00140
PSE00160
PSE00170
PSE00170
PSE00170
                     PSE00040
PSE00050
 PSE00030
                                                               PSE00060
                                                                                   PSE00070
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PSE00250
/*** THIS IS A SUBROUTINE AT THE MM LEVEL WHICH PUTS AN SEU ACCORDING *** TO ITS PREASSIGNED ID INTO THE STORAGE AREA. IT DECOMPOSES AN *** SEU INTO B-BYTE PACKTES AND CALLS PAKT TO WRITE THEM INTO DSH */
                                                                                                                                                                                                                                                                         /* WRITE FIRST 8 BYTES OF THIS SEU */
/* ESTABLISH THE REST OF SEU */
/* L * # OF PACKETS IN THIS SEU -1 */
/* PUT ALL PACKETS */
                                                                             XINCLUDE DSEU1, EPAKT;
DCL DATA CHAR(8), VA FIXED BIN(31), (TP,8P) PTR;
DCL (1,RIN CODE) FIXED BIN, BASED_DATA CHAR (8) BASED (8P);
DCL (NULL,ADDR,SUBSTR,MIN,UNSPEC) BUILTIN, (L,L1,L2) FIXED BIN(31);
DCL ID BIT(32);
                                                                                                                                                                                                                                                                                                                  L = (SEU.N + 2)/8; /+ L = DO I = 1 TO L; /* PUT L1 = 1+8-2; L2 * MIN(8,SEU.N-L1+1); DATA = SUBSTR (SEU.DATA,L1,L2); CALL PAKT (VA+I*8,DATA,W');
                                                                                                                                                                                                             RIN_CODE = 0;
UNSPEC(VA) * ID;
DATA = SEUPTR -> BASED_DATA;
CALL PAKT (VA,DATA,'W');
                                                                                                                                                                                                                                                                                                                                                                                                                             END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RETURN;
```

END:

PSE00260

END /\*REP\*/;

RETURN;

CALL TRIN(PROC\_ADDR. RTP);

REP00250 REP00270 .

```
REP00170
REP00180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   REP00250
                    REP00020
                                          REP00030
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL SRCH (BINFO.PSETID(2), DATA,ID2, RTN CODE);
IF RIN CODE=1 THEN RETURN;/*RTNCODE 1 IS TARGET OF ARC NOT FND+/
END /*WHEN 'A'+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                          •
                                                                                                                                                                                                                                                                                                                                                                                                                                                      ELSE DO: /* WHEN FUNC IS MULTIPLE SEE IF DATA ALREADY EXISTS CALL SRCH(BINFO.PSETID(2),DATA,ID2,RTN_CODE);

IF RIN CODE=1 /*NOT FOUND*/
THEN CALL CRTP(BINFO.PSETID(2),DATA,IO2,RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                 CALL REPP (BINFO.PSETID(2), DATA, ID2, RTN_CODE);
ELSE CALL CRTP (BINFO.PSETID(2), DATA, ID2, RTN_CODE);
END /* IF 'S' */;
                                                                                                         DCL (PARENT, BSETID, 101,102) BIT (32), DATA BIT (*);
DCL RIN_CODE FIXED BIN, MODE CHAR (1), P PTR, NULL BUILTIN;
                                                                                                                                                                                                                                                                                WHEN ('N') DO;/* NODE MODE OF REPLACE OF BINARY ASSOC*/
IF BINFO.FUNC*'S' THEN DO; /*REPLACE IT*/
IF ID2 ~* UNSPEC (NULL) THEN
                                                                                                                                                               CALL GBCT (BSETID, BINFO, RTN_CODE);
CALL RET1 (ID1.P.RTN_CODE); /* GET SOURCE OUT */
ID2 = BEU.ID ARRAY (BINFO.POS); /* GET OLD TARGET */
SELECT (MODE);
REPB: PROC (PARENT, BSETID, ID1, DATA, MODE, RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WHEN ('A') DO; /*ARC MODE OF REPLACEMENT */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /*ENTER ID2 INTO ID1 ID ARRAY*/
BEU. ID_ARRAY(BINFO.POS)=ID2;
CALL_REP! (ID1,P,RTN_CODE);
                                            XINCLUDE DBCAT, DBEU;
XINCLUDE EBCT, ESRCH, ECRTP, ESUB1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   END /*WHEN N*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            END /*SLECT*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RTN_CODE=0;
END /+REPB+/;
```

```
REPO0040
REP00050
REP00050
REP00090
REP000100
REP00110
REP00010
REP00020
                                          REP00030
                                        /* A S-PROC AT THE N-ARY LEVEL USED TO REPLACE THE DATA OF A P-ELEMENT (DESIGNATED BY ID) IN A PSET (DESIGNATED BY PSETID) WITH NEW DATA (GIVEN AS DATA); IT IS AN ERROR IF ID IS MULL OR IS BAD */
                                                                                                                                                                                                                                                        CALL RET! (10.P.RTN_CODE); /* GET SOURCE */
IF P * NULL | RTN_CODE ^* O THEN DO; RTN_CODE * + RTN_CODE;
RETURN; END; /*** 1+ IS BAD SOURCE */
                                                                                                                           XINCLUDE ESUB1;
XINCLUDE ESUB1;
DCL (PSETID.ID) BIT (32), P PTR, RTN_CODE FIXED BIN;
DCL (NULL,UNSPEC) BUILTIN;
DCL DATA BIT (+);
 REPP: PROC (PSETID, DATA, ID, RIN_CODE);
                                                                                                                                                                                                                                                                                                                                             BEU.DATA + DATA; /+ REPLACE DATA +/
Call Rep1 (10,P.RTN_CODE);
END /+REPP +/;
```

REP1: PROC (ID, P.RTN\_CODE);

```
DUMOOO40
DUMOOO50
DUMOOO60
DUMOOO70
                                                                                                                               DUMOO100
DUMOO110
DUMOO120
                                                                                                                                                                                                 DUMOO 140
DUMOO 150
DUMOO 160
DUMOO 170
DUMOO 190
DUMOO 190
DUMOO 200
               DUMO0030
                                                                                               DUMO0080
DUM00020
                                                                                                               DUMO0090
                                                                                                                                                                                  DUMO0130
                                                                                                                                                                                                                                                                                                                                    DUM00220
                                                                                                                                                                                                                                                                                                                                                  DUMO0230
                                                                                                                                                                                                                                                                                                                                                                       DUM00240
              /*A S-PROC AT THE N-ARY LEVEL FOR COMMUNICATING DIRECTLY WITH THE ** REP MODULE AT THE MM LEVEL*/
                                                                                                                                                                                                                                                                                 XINCLUDE AREP, DBEU, SERVICE;
DCL ID BIT (32), (P.P1.BP) PTR,(RTN_CODE.I.J,K) FIXED BIN;
DCL (MJLL,UNSPEC,STRING,SUBSTR) BUILTIN;
DCL BIT_STRING BIT (800) BASED;
                                                                                                                                               /+FILL UP REP_ARG*/
ALLOCATE REP_ARG SET (P1);
P1->REP_ARG.N=NUMPTR+32+DLEN+32;
P1->REP_ARG.DATA = P->BIT_STRING;
P1->REP_ARG.ID=ID;
/+CALL UP REP*/
                                                                                                                                                                                                                                                                                                                                                  RIN_CODE *BP ->REP_RIN.RIN_CODE;
CALL_SVC3(P1); CALL_SVC3(BP);
                                                                                                                                                                                                                                                 CALL TCALL ('REP', 1, P1, BP);
```

DUMO0250 DUMO0260

FILE: Ret

```
RET00010
RET00020
RET00040
RET00050
RET00050
RET00010
RET00110
                                                                                                                                                                                                                                      CALL GSEU (RET_ARG.ID, SEUPTR, RTN_CODE); /+ GET SEU DESIGNATED BY ID +/
IF RTN_CODE ^* O THEN RTP->RET_RTN.RTN_CODE * 1;
ELSE DO;
                                    /* A T-PROC AT THE MM LEVEL FOR RETRIEVAL OF BEU GIVEN ITS ID +/
/* FOR INTEGRATED VERSION: MAKE USE OF SUBROUTINE GSEU (GET SEU) +/
                                                                                                                                                                                                                                                                                           RTP->RET_RTN.N = SEU.N+8;
RTP->RET_RTN.DATA = UNSPEC(SEU.DATA);
END;
                                                                                       **MINCLUDE ARET, SERVICE, DSEU1, EGSEU; DCL (P.RTP,TP) PTR; DCL (UNSPEC,NULL) BUILTIN; DCL (I.RTN_CODE) FIXED BIN;
                                                                                                                                                                                  CALL TBEG (PROC_ADDR.P);
ALLOCATE RET_RTN SET (RTP);
                                                                                                                                                                                                                                                                                                                                                                   CALL TRIN (PROC_ADDR,RTP);
RETURN;
END;
   RET: PROC:
```

```
RET00010
RET00020
                                                                                 RE T00060
RE T00070
RE T00080
RE T00090
                                                                                                                                                                                                       RET00130
RET00140
RET00150
RET00160
RET00170
RET00180
                                                                                                                                                                                                                                                                                                                            RE100210
RE100210
RE100220
RE100230
RE100240
                                   RE 100030
                                                   RE100040
                                                                   RE T00050
                                                                                                                                                        RE T00 100
                                                                                                                                                                        RET00110
                                                                                                                                                                                        RET00120
                                 /* A S-PROC WITHIN N-ARY LEVEL WHICH OBTAINS THE ID OF THE BINARY * ASSOCIATED ELEMENT IN BSETID OF ID: IN PARENT PSET*/
                                                                                                                                                                                                                                                                                                                                                                            ELSE CALL RET'(102,PTR2,RTN_CODE); /+CHECK IF 102 LEGAL+/
RETURN;
END /*RET8+/;
                                                                                                                                                                                                                        IF PTRI-NULL THEN DO; RTN_CODE-10+RTN_CODE; RETURN; END;
RETB: PROC (PARENT, BINFO, PTR1, PTR2, RIN_CODE);
                                                                               XINCLUDE CBCAT.ESUB1.DBEU;
XINCLUDE EBCT;
DCL PARENT BIT(32) ALIGNED.
(RIN_CODE.POS) FIXED BIN;
DCL (PTR1,PTR2) PTR.(MULL.UNSPEC) BUILTIN;
DCL ID2 BIT(32);
POS=BINFO.POS; /*GET PTR SLOT FOR BSET*/
                                                                                                                                                                                                                                                          ID2-PTR1->BEU. ID_ARRAY(POS);
                                                                                                                                                                                                                                                                                          IF ID2-UNSPEC(NULL)
                                                                                                                                                                                                                                                                                                                                          RTN CODE . O.
                                                                                                                                                                                                                                                                                                            THEN DO:
PTR2 = NULL;
                                                                                                                                                                                                                                                                                                                                                               EKO:
```

```
RET00220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RET00330
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                          RET00020
                                                RET00030
                                                                        RET00040
                                                                                              RET00050
                                                                                                                    RE T00060
                                                                                                                                          RET00070
                                                                                                                                                                  RE T00080
                                                                                                                                                                                        RET00090
                                                                                                                                                                                                              RE T00 100
                                                                                                                                                                                                                                      RET00110
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DO PERTE ARG. PTR REPEAT P->RETE_ARG.PTR WHILE (P^=NULL);

NODE #RETE ARG.NODE; : ...

ENAME = MAINFO. ENAME (RETE_ARG.PARENT);

ANAME = RETE ARG.NAME;

CALL GACT (ANAME; CALL GACT (ANAME; CALL GACT (ANAME; CALL GACT); ARG.NAME; CALL GACT (ANAME; CALL GACT); ARG.NAME; CALL GACT (ANAME; CALL GACT); ARG.NAME; CALL SVC3 (RP); AREE UP RETN ALLOCATION UP TO NOW*/

CALL SVC3 (RP); ARREE UP RETN ALLOCATION UP TO NOW*/

CALL TRIN (PROC_ADDR, RTP); ARETURNS**/
                                                                                                                                DCL (P.TP.RP.LP.TP1,RTP.PP) PTR, NULL BUILTIN;
DCL(RTN CODE.1,J) FIXED BIN, NUM F XED BIN (31);
DCL BDATA BIT (320), CDATA CHAR (40), DLEN FIXED BIN;
DCL TO BIT FIXED BIN INIT (1), TO_CHAR FIXED BIN INIT (2);
DCL (ENAME, ANAME, ENAME1) CHAR (8);
DCL 1 MAINFO (25), /*NA ARRAY OF AINFO TO STORE RETRIEVED ACAT ENT*/
2 BSETID BIT (32), /*BSETID OF TARGET NODE**/
2 ENAME CHAR (8), /*IF TARGET IS A ENTITY SET*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALL GECT (ENAME, EINFO, RTN_CODE); /+GECT GETS ENTITY CAT ENTRY +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     I=TP->RETN_ARG.CBTP; J=TP->RETN_ARG.LEN; PP=TP->RETN_ARG.PTR; TP->RETN_ARG.RETE_ARG, BY NAME; TP->RETN_ARG.CBTP=I; TP->RETN_ARG.LEN=J; TP->RETN_ARG.LEN=J; TP->RETN_ARG.LEN=DP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RIP->RETE RIN.RIN.CODE=100; /**100 IS NO SUCH ENTITY**/
CALL TRIN (PROC_ADOR.RIP); /**RETURNS**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL TBEG (POC ADDR.P);
ALLOCATE RETE RTN SET (RTP);
RTP->RETE RIN RTN CODE=O; /*INIT TO O.K.*/
ENAME=RETE ARG.NAME;
MAINFO.ENAME(1)=ENAME; /*INIT AINFO ARRAY'S FIRST TOKEN*/
                                              XINCLUDE ARETE, FDEBUG, SERVICE, ARETN;
Xinclude decat;
RETE:PROC( ) /*I-PROC TO PROCESS RETE **/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ALLOCATE RETN_ARG SET (TP);
                                                                                              XINCLUDE EGECT. EGACT, EVTPE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TP->RETN ARG. PSETID=EINFO;
                                                                                                                                                                                                                                                                                                                                                         MAX FIXED BIN (31),
                                                                                                                                                                                                                                                                                                                                                                               MIN FIXED BIN (31).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /**ALLOCATE ROOT NODE**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF RIN CODE -- O THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                         MEN FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                   TYPE CHAR (1).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /+FOLLOW RETE TREE ++/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FEGIN PROCESSING ...
                                                                                                                                                                                                                                                                                                                                                                                                                               FUNC CHAR(1).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*NO PRED*/
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RP, LP-TP
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...,

FILE: RETE

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RET00670
RET00680
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RET00950
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               RE100570
                                   RET00580
                                                      RET00590
                                                                                           RET00610
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /+ %INCLUDE HEX:+/
/+ PUT SKIP LIST ('(RETE) RETN_RTN1', RETN_RTN1,HEX(RETE_RTN1.PTR));+/
ALLOCATE RETE_RTN1 SET (TP1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*CHECK TELECTION OF THE TOTAL CODE;
IF I^-SPETN RIV.RIV.CODE;
IF I^-SPETE DO;
RTP->RETE ROW;
CALL SVC3 (RP);
CALL SVC3 (TP);
CALL SVC3 (TP);
CALL SVC3 (TP);
CALL TRIN (PROC_ADDR, RTP);
                                                                                                                                DLEN-RETE_ARG.PRED.DLEN(1);
CALL VTPE_(AINFO,TO_BIT,BDATA,CDATA,DLEN,RTN_CODE);
IF RIN_CODE^*O THEN_DO; /*PROBLEMS**/
RIP->RETE_RIN.RIN_CODE*NODE; /*1* IS ILLEGAL NODE DATA*/
CALL SVC3(RP); /*FREE UP RETN ALLOCATION UP TO NOW*/
CALL TRIN (PROC_ADOR, RTP); /*RETURNS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                      PP=TP->RETN_ARG. PTR:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TP->RETN_ARG.PTR*PP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /*COPY RETN RINI INTO RETE_RIN! WHILE FIXING UP DATA **/
DO P=TP->RETN_RIN.PTR REPEAT P->RETN_RIN!.PTR WHILE (P^=NULL);
                                                                                                                                                                                                                                                                                                                                     /*REPLACE ANAME WITH PSETID AND BSETID AND FIX UP DATA**/
                                     MAINFO(NODE)=AINFO; /+ENTER INTO AINFO ARRAY+/
                                                                                                                                                                                                                                                                                                                                                                                                                                   I=TP->RETN_ARG.CBTP; J=TP->RETN_ARG.LEN; TP->RETN_ARG.RETE_ARG, BY NAME; TP->RETN_ARG.CBTP=I; TP->RETN_ARG.LEN=J;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RIP->RETE_RTN.N=TP->RETN_RTN.N; /+COPY+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF RETE ARG.N ~=0 THEN DO;
TP->RETN ARG.PRED.DLEN(1)=DLEN;
TP->RETN ARG.PRED.DATA(1)=BDATA;
                                                                                               IF RETE_ARG.N^*O THEN DO;
CDATA*RETE_ARG.PRED.CDATA(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TP->RETN_ARG.PSETID*AINFO.PSETID;
TP->RETN_ARG.BSETID*AINFO.BSETID;
                                                                            /*VERIFY PREDICATE DATA ***/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END./*DO P=RETE_ARG.PTR...*/
                                                                                                                                                                                                                                                                                                                                                        I RETE ARG.N;
ALLOCATE RETN ARG SET (TP);
LP->RETN ARG.PTR*TP; LP=TP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALL TCALL ('RETN', 1, RP, TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /+CALL UP RETN ++/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*CHECK RETURNS*/
                                                                                                                                                                                                                                                           RE TURN:
                                                                                                                                                                                                                                                                               ENO:
RE TURN:
                                                                                                                                                                                                                                                                                                  ES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LP=RIP:
```

RET01130 RET01140

RET01150

RETO1110 RETO1120

```
LP->RETE RIVI: DRATP; LP=TP;

LP->RETE RIVI: CBTP-TP; LP=TP;

I=PT->RETE RIVI: CBTP-TP

TP1->RETE RIVI: CBTP-TP

NODE=RETNI: NODE;

IF NODE = 1 THEN DOI;

ANDE-RETNI: NODE;

IF NODE = 1 THEN DOI;

ANDE-RETNI: NODE;

SELECT(AINFO: TPPE);

WHEN ('V') DO;

BDATA-RETNI RIVI: DLEN=O

CALL VIPE (AINFO: TD CHAR, BDATA, DLEN, RIVI_CODE);

TP1->RETE RIVI: DLEN=DLEN;

TP1->RETE RIVI: DLEN=O

(AINFO: TD CHAR, BDATA, DATA;

END;

CALL SKEP LIST('RETE)RETERIV', TP1->RETE RIVI: HEX(TP1->RETE RIVI: PTR);

CALL SVC3 (RP);

A FREE UP ARG AND RIVI LIST FROM RETN'/

CALL SVC3 (RP);

CALL RIVI (PROC ADDR, RTP); /*RETURNS WITH ARGUMENTS*/

DOP PRIP REPEAT RETE RIVI. PTR WHILE (P'=NULL);

END;

END;

END;

END;

END;

CALL RIVI (PROC ADDR, RTP);

CALL RIVIN (PRO
```

RETO1160 RETO1170 RETO1170 RETO1190 RETO1200 RETO1230 RETO1230 RETO1240 RETO1250 RETO1260 RETO1260 RETO1280 RET01320 RET01330 RET01350 RET01350 RET01360 RET01380 RET01390 RET01400

RET01310

FILE: RETN

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/**/RET01030
/**/RET01040
/**/RET01050
/**/RET01060
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /**/RET00900
DATA')RET00910
                   RET00570
                                                                                                             RE TOOG 10
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                                                                                                                                                                                                                                                                                             3 PLEN /*IN NUMBER OF BYTES*/ FIXED BIN,
3 PTYPE CHAR (1), /*'N' OR'X' OR '8' OR 'C'*/
3 LTYPE BIT (8), /*'00000001' IS LINK LIST*/
3 L_ID BIT (32), /*ID OF THE FIRST BEU IN THIS SET**/
3 L_POS FIXED BIN , /*POS IN ID_ARRY USED FOR LINEAR CHAINING
OF BEU'S WITHIN THIS SET*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PUT SKIP EDIT(REIN ARG.NODE, HEX4(ADDR(REIN ARG. PSETID) ->BP),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PUT EDIT(RETN ARG.DP(1), RETN_ARG.DLEN(1), ')

(X(1), B(8), F(3), A);

DO II=1 TO RETN_ARG.DLEN(1)/4; DCL 11 FIXED BIN;

PUT EDIT(HEXA(ADDR(REIN_ARG.DAIA(1))->PAA(11)))(A(8));

XINCLUDE HEX; DCL BP PTR BASED;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ᆸ
                                                                                                                                                                              2 POS FIXED BIN, /*POS OF POINTER ARRAY OF PSETID1 USED */
2 FUNC CHAR (1); /*'S' OR 'M'*/;
/*DCLS OF PSET CATALOGUE AT THE N-ARY LEVEL*****/
                                                                                                                                                                                                                                                                                                                                                                                                                                        3 L POS2 FIXED BIN,
3 MAP BIT (32) ; /*UP TO 16 PTRS ARE ALLOWED FOR A BEU*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PUT SKIP EDIT('NODE +PSETID+ PAR +*GET+++ N +BSETID+ +++0P+++
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DCL PAA(10) PTR BASED;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ALLOCATE RETN RTN SET (RTP);
RTP->RETN RTN RTN CODE=0; /*INIT RTN CODE TO D.K.*/
LP=RTP: /*LP INIT TO FIRST TOKEN TO RETURN*/ K=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REIN ARG. PARENT, REIN ARG. GET, REIN ARG. N. ' ')

(F(3), X(2), A(8), F(3), X(2), B(8), F(2), A);

IF REIN ARG. PARENT = 0 THEN PUT EDIT(

HEXA(ADDR(REIN ARG. BSETID) -> BP))(A(8));

ELSE PUT EDIT(' ')(A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DO P-MP REPEAT P->RETN ARG. PTR WHILE (P--NULL);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RNODE*RETN_ARG.NODE; /+RNODE IS ROOT NODE# +/
/+INIT PSET STRUCTURE+/
   DCL BDATA BIT(320) VARYING ALIGNED;
DCL (OP BIT(8), VES BIT(1)) ALIGNED;
DCL (PARENT, BSETID) BIT(32) ALIGNED;
DCL (K,NODE, I) FIXED BIN;
/*DCL OF BCAT TEMPLATE*/
(RNODE RIN COOE) FIXED BIN:
                                                                                                                                      1 BINFO (25),
2 PSETID(2) BIT (32),
                                                                                                                                                                                                                                                                             3 NUMPTR FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL TBEG(PROC ADDR, MP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RETN_ARG.N^=0
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IF FFFN THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                       1 PINFO (25)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EZ:
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EZO:

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                                                                                                                                                                                                                                                 THEN CALL GBCT (RETN ARG.BSETID, BINFO (RETN_ARG.NODE), RIN_CODE);
PSET(RETN_ARG.NODE)=RETN_ARG.PSETID;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       BDATA=SUBSTR(RETN_ARG.PRED.DATA(1).1,
REIN_ARG.PRED.DLEN(1)*8);
CALL_VERIF_(PINFO(RNODE),ROOT_PTR,OP,BDATA,RIN_CODE,YES);
                                                                                                                                                                                                                CALL GPCT (RETN_ARG.PSETID, PINFO(RETN_ARG.NODE), RIN_CODE);
IF RETN_ARG.NODE ^* RNODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IF -YES THEN GO TO NEXT_ROOT; /*DISCARD THIS ROOT NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DO P=RETN ARG.PTR REPEAT P->RETN_ARG.PTR WHILE (P^=NULL);
NODE=RETN_ARG.NODE;
PARENT =PSET(RETN_ARG.PARENT);
BSETID=RETN_ARG.BSETID;
                                                                                                                                                                                                                                                                                                    CALL RETP(PINFO(RNODE),NULL,ROOT_PTR,RTN_CODE); /*1ST BEU*/
/*BEGIN TREE PROCESSING*/
                                                                                                                    RIP-SETN_RIN.RIN_CODE=1;
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(RETN) ERR RIN'PSET DATA STRUCTURE OVER FLOW (LIMIT 25)');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   THEN DO: /*VERIFY NODE DATA AGAINST PREDICATE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IF RETN_ARG.N ^* O THEN GO TO NEXT_ROOT;
                                                                     DO P-MP REPEAT P->RETN_ARG.PTR WHILE (P^=NULL);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PTR1 = CURSOR (REIN_ARG. PARENT);
                                                                                                                                                                                                                                                                                                                                                                                                          IF ROOT PTR = NULL
THEN LEAVE OUTER LOOP;
ELSE CURSOR(RNODE) = ROOT_PTR;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     OP=REIN_ARG.PRED.OP(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CURSOR (NODE) - NULL;
                                                                                                                                                                                                                                                                                                                                                                        /*ROOT NODE PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /+NEXT RET TREE LEAF+/
                                                                                         IF RETN_ARG.NODE>25
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IF RETN_ARG.N >= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IF RTN_CODE^=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF PTR1 . NULL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GO TO RTN;
                                                                                                                                                                                                                                                                                                                                                         DO WHILE ('1'B);
                                                                                                                                                                                GO TO RIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EZO:
                                                                                                                                                                                                                                                                                                                                         OUTER_LOOP
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RE T02010
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           RET01670
                               RETO1680
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                                                                                                                                                 RET01740
                                                                                                         TTP->RETN_RIN.RIN_CODE=4; /***** RIN CODE 4 **********
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(REIN) ERR RIN ',
'AFTER CALLING RETB WHICH GIVES RIN CODE',RIN_CODE);
GO TO RIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                              RTP->RETN_RTN_RTN_CODE=5; /*** RTN CODE 5 ****/
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(RETN) ERR RTN ',
'AFTER CALLING VERIF WHICH GIVES RTN CODE', RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IF ~YES THEN GO TO NEXT_ROOT; /*DISCARD CURRENT ROOT*/
                                                                                                                                                                                                            CURSOR(NODE)*PTR2;
IF PTR2*NULL & REIN ARG.N ^* O THEN GO TO NEXT_ROOT;
/* IF PREDICATE ISSUED THEN DISCARD NULL ATTRIBUTE */
                                                                                                                                                                                                                                                                                                                                              BDATA = SUBSTR(RETN ARG.PRED.DATA(1),1,
RETN ARG.PRED.DLEN(1)*8);
CALL VERIF(PINFO(RNODE),PTR2.OP,8DATA,RTN_CODE.YES);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RTP->RETN_RTN.RTN_CODE=6; /****** RTN_CODE 6 *********/
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(RETN) ERR RTN',
'AFTER CALLING BUILD WHICH GIVES RTN CODE',RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RTP->RETN_RTN.RTN_CODE=2; /*****RTN CODE 2 ********/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL RETP(PINFO(RNODE), CURSOR(RNODE), ROOT_PTR, RTN_CODE);
                                                  CALL RETB(PARENT, BINFO(NODE), PTR1, PTR2, RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /*NOW A COMPLETE SET OF CURSOR HAS BEEN SET UP*/
K*K+1; /*INDEX TO OCCUR OF ROOT NODE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CALL BUILD (CURSOR, PSET, MP.K, LP, RIN_CODE);
                                                                                                                                                                                                                                                                                          IF PTR2 - NULL & RETN_ARG. N = 0
                                                                                                                                                                                                                                                                                                                               OP-RETN_ARG. PRED. OP(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RTP->RETN_RTN.RTN_CODE=6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FREE CURSOR(I)->BEU;
                                                                                                                                                                                                                                                                                                                                                                                                            IF RTN CODE - *O
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CURSOR(I) - NULL;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF CURSOR(I) ~= NULL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GO TO RTN;
                                                                         IF RTN CODE -- 0
                                                                                                                                                                                                                                                                                                                                                                                                                                THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IF RIN_CODE ^= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    I = 1 TO 25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IF RIN_CODE^*0
                                                                                             THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GO TO RTN;
                                    ELSE DO:
END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ë.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NEXT_ROOT
```

₹

PL 10PT

FILE: RETN

IF FDEBUG.LEV2 THEN PUT SKIP LIST ('(RETN) ERR RTN '. AFTER CALLING RETP WHICH GIVES RTN CODE'.RTN\_CODE);

IF MP->RETN\_ARG. GET-RETNGET. ANY & K > 0 /+DONE+/

END:

THEN DO:

IF ROOT PTR -= NULL THEN FREE ROOT PTR->BEU;

END;

END /\*DO WHILE\*/;
RIP->REIN\_RIN.N = K;
RIN: CALL TRIN(PROC\_ADDR,RIP); END /+RETN+/;

RE 1022 10
RE 102230
RE 102230
RE 102240
RE 102260
RE 102260
RE 102280
RE 102290
RE 102300
RE 102300
RE 102330

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RET00030
RET00040
                                                               RET00050
RET00060
RET00080
RET00090
RET00100
RET00120
RET00140
RET00140
RET00150
RET00160
RET00160
RET00160
RET00160
                                                                                                                                                                                                                                                                                                                                                    RE100220
RE100230
RE100240
                                                                                                                                                                                                                                                                                                                                     RET00210
                         /* A S-PROC AT THE N-ARY LEVEL WHICH RETRIEVES THE ID OF THE P ELEM * THAT FOLLOWS ID; IN PSETID. IF ID! IS MULL THEN IT RETRIEVES THE * THE FIRST OCCR IN PSETID*/
                                                                                                                                                  DCL RIN CODE FIXED BIN;
DCL (P.PTR1,PTR2) PTR, (NULL,UNSPEC) BUILTIN;
DCL ID2 BIT (32);
                                                                                                                                                                                                                                                                 ELSE ID2*PTR1->BEU.ID_ARRAY(PINFO.L_POS);
IF ID2 * UNSPEC (NULL) THEN DO;
RIN_CODE * O;
PTR2 * NULL;
RETURN;
RETP: PROC(PINFO, PTR1, PTR2, RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                CALL RET! (ID2, PTR2, RTN_CODE);
RETURN;
                                                                                                                                                                                                                   IF PTR1* NULL /*GET FIRST*/
THEN ID2*PINFO.L_ID;
                                                                                                XINCLUDE DBEU.DPCAT;
XINCLUDE EPCT, ESUB1;
```

FILE: RET1

```
DUMOOO 10

DUMOOO 20

DUMOOO 20

DUMOOO 20

DUMOOO 20

DUMOOO 10

DUMOO 20

DUMOO 30

DUMOO 30
                                                                                                                                                                                                                                                     /* MEMORY REQUEST TRACE ON +/
   RETT:PROC(ID,P,RTN_CODE);
/*S-PROC AT THE LOWEST LAYER OF THE N-ARY LEVEL TO SET UP CALL FOR
** RETRIEVAL OF ELEMENT DESIGNATED BY ID*/
                                                                              XINCLUDE SERVICE, ARET, DBEU;
DCL ID BIT (32), (1,J,K) FIXED BIN, (P,RP) PTR;
DCL (SUBSTR, UNSPEC, MULL, ADDR) BUILTIN, RIN_CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                      IF AP->RET RIN.RIN_CODE^*O THEN DO; /*ID INVALID*/
CALL SVC3(AP);
P*NULL;
                                                                                                                                                                                                                                                                         /:·/
                                                                                                                                                                                                                                     THEN CALL DUMPIT ('RETRIEVED', ID.NULL);
DCL FFF BIT (1) EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    P=ADDR(AP->RET_RTN.DATA);
I=NUMPTR;J=DLEN;
ALLOCATE BEU SET (RP);
RP->BEU.DATA=BEU.DATA;
RP->BEU.ID_ARRAY=BEU.ID_ARRAY;
CALL_SVC3_(AP);
                                                                                                                                                        ALLOCATE RET ARG; RP=P;
RET ARG.ID=ID;
CALL TCALL ('RET',1,RP,AP);
                                                                                                                                                                                                                                                                                                                                                    CALL SVC3 (RP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              END/+RET1+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RTN_CODE=0;
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETURN:
                                                                                                                                                                                                                                                       IF FFF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P=RP;
```

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SET00050
SET00060
SET00070
                                                                                                                                                                                                                                                                                       SET00180
SET00190
SET00200
SET00210
SET00010
SET00020
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SET00320
SET00330
SET00340
                                  SET00030
                                                  SET00040
                                                                                                                                    SET00090
                                                                                                                                                                                                                       SET00140
                                                                                                                                                                                                                                                        SET00160
                                                                                                                                                                                                                                                                                                                                                           SET00220
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                                                                                                                    SET00080
                                                                                                                                                     SET00100
                                                                                                                                                                     SET00110
                                                                                                                                                                                     SET00120
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SET00290
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SET00300
                                                                                                                                                                                                                                                     LIST ('ENTER SYSTEM ERROR MESSAGE TRACE OPTION (4 BITS)');
EDIT (FDEBUG.LEVO) (8(1));
EDIT (FDEBUG.LEV1) (8(1));
EDIT (FDEBUG.LEV2) (8(1));
EDIT (FDEBUG.LEV3) (8(1));
                                                                                                                                                                                                                                                                                                                                                                                                                             FFFN BIT (1) EXT;
LIST ('ENTER UPDN/RETN REQUEST TRACE OPTION (1 BIT):');
SETFH: PROC;/+ SUBROUTINE FOR SETTING FH TRACE OPTIONS +/
                                                                                                                                                                                                                                                                                                                                                        FFF BIT(1) EXT;
LIST('ENTER MEMORY REQUEST TRACE OPTION (1 BIT):');
EDIT(FFF)(B(1));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LIST ('ENTER TIMING REPORT TRACE OPTION (1 BIT):'); EDIT (FTIME) (B(1)); SKIP LIST ('FH TRACE OPTIONS ENDS');
                                                                                           DCL (P,RP) PTR; XINCLUDE FDEBUG;
DCL FTCALL(4) BIT (1) EXT;
ON ERROR SNAP SYSTEM;
PUT SKIP LIST ('ENTER FH TRACE OPTIONS');
PUT LIST ('ENTER TCALL TRACE OPTION (4 BITS)');
DO I = 1 TO 4;
              /*** FTCALL -- TCALL ONLY;
FDEBUG -- ALL MODULES AT ALL LEVELS;
FFF -- RET1, REP1, CRT1, DEL1 ONLY;
FFFN -- RETN, UPDN ONLY;
                                                                                                                                                                                                     GET EDIT (FTCALL(1))(B(1));
                                                                                                                                                                                                                                                                                                                                                                                                                                                              EDIT (FFFN) (8(1));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DCL FTIME BIT(1) EXT;
PUT LIST ('ENTER TIMING
GET EDIT (FTIME) (B(1))
PUT SKIP LIST ('FH TRAC
END;
                                                                                                                                                                                                                                                                                                                                                                                                                             PUT
GET
                                                                                                                                                                                                                                                                                                                                                           DCL
PUT
GET
                                                                                                                                                                                                                                                        PUT
GET
GET
GET
GET
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FILE: SHWE

SHWE: PROC

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SHWOOO40
SHWOOO50
SHWOOO60
SHWOOO70
SHWOOO90
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SHW00110
SHW00120
SHW00130
SHW00150
SHW00160
SHW00160
SHW00200
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SHW00410
SHW00420
SHW00430
SHW00460
SHW00460
SHW00460
SHW00460
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SHWOOS 10
SHWOOS2O
SHWOOS3O
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SHW00380
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RETE_RIN.N=0 THEN DO;
SHWE_RIN.RIN_CODE=-2; /*** -2 IS NO ENTITY SET DEFINED ******/
CALL_SVC3 (P); GO TO RIN; END;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /* T-PROC AT THE ENTITY LEVEL, INVOKED IN RESPONSE TO A CALL FROM MODULE DDQ AT THE USER INTERFACE LEVEL TO RETRIEVE DATA DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DO P= RETE_RTN.PTR REPEAT RETE_RTN1.PTR WHILE (P^=NULL);
IF RETE_RTN1.NODE=2 /* ENAME NODE */
THEN DO; PP->SHWE_RTN2.ENAME(I)=RETE_RTN1.CDATA;
GO TO NEXTI;
                                                                   XINCLUDE SERVICE, ASHWE, DECAT, EGACT, EGECT, ARETE, EALLA;
DCL (P, LP, TP, PP, RP) PTR, NULL BUILTIN, (RTN_CODE, I,N) FIXED BIN;
DCL MOD BUILTIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SHWE_RTN.PTR=PP;
                                                                                                                                                                                                                     IF NAME1='+' THEN DO: /+ALL ENTITY SETS QUERIED +/
                                                                                                                                                                                                                                                                                                                                               ALLOCATE RETE_ARG; LP->RETE_ARG.PTR=P; LP=P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /*COPY ENAMES RETRIEVED INTO SHWE_RIN2 */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END; /*GET OUT P LOOP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL SVC3 (TP); GO TO RTN; /* DONE
                                                                                                                                                                                                                                                     /* CALL UP RETE TO RETRIEVE DATA
                                                                                                                                                             CALL TBEG (PROC_ADDR, SHWE_ARG_P);
ALLOCATE SHWE_RTN; LP*SHWE_RTN_P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            N*RETE_RTN.N;
ALLCCATE SHWE_RTN2 SET (PP);
PP->SHWE_RTN2.NUM_ENAME=N;
                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL TCALL ('RETE', 1,RP, TP);
                                                                                                                                                                                                                                                                    ALLOCATE RETE ARG; RP.LP-P;
RETE_ARG.NAME"'E*ESET';
RETE_ARG.GET=RETEGET.ALL;
                                                                                                                                                                                                                                                                                                                                                           RETE ARG. NODE=2;
RETE ARG. NAME='A+ENAME';
RETE ARG. GET=RETEGET. ALL;
RETE ARG. PARENT=1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             END /* P LOOP */;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NEXTI: END /+ DO 1 +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /* EXAMINE RETURNS */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALL SVC3 (RP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DO 1 - 1 TO N;
                                                                                                                                            /* BEGIN */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                P=TP:
                                      INFO */
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SHW00940
SHW00950
                    SHW00570
                                      SHW00580
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ALLOCATE SHWE RIN1 SET (TP);
LP->SHWE RIN1.PTR=TP; LP=TP;
TP->SHWE RIN1.DATA=AINFO, BY NAME;/* COPY AINFO INTO RETURN TOKEN*/
TP->SHWE RIN1.ANAME=NAME2(I);
END /* DO I */;
                                                                                                                                                                                                                                                                                                                                                          /*******
                                                                                             •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CALL GACT (NAME2(I), NAME1, AINFO, RTN_CODE);
IF RIN_CODE ^* O THEN DO;
SHWE_RIN_RTN_CODE*I; /*O+ IS PROBLEM WITH ATTRIBUTE NAME ****/
                                  /*CHECK ENTITY SET , WHEN ENTITY SET NAME IS GIVEN */
CALL GECT (NAME1, EINFO, RTN_CODE);
IF RTN_CODE ^*O THEN DO;
SHWE_RTN_RTN_CODE=-1; /***** -1 IS PROBLEM WITH ENTITY SET NAME
                                                                                                                                                                                                                                                            /* CALL UP ALLA TO RETRIEVE ALL ATTR NAMES +/
                                                                                                                                                                                                                                                                                                                                 IF NUM NAME2 =0 THEN DO; /* NO ATTRIBUTES DEFINED */
SHWE RIN.RIN CODE=-3; /*** -3 IS NO ATTRIBUTES FOUND
GO TO RIN; END;
END /* IF 999 */;
                                                                                                                                                                                                                                                                                                                                                                                                                                  /* BY NOW NAME2 CONTAINS ATTRIBUTES TO BE SHOWN */
                                                                                                                                                                                                                        NUM NAME2 * 0;
CALL ALLA (NAME1, NAME2, NUM_NAME2, RTN_CODE);
                                                                                                                                                                                     IF NUM_NAME2=999 /* ALL ATTRIBUTES +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RTN: CALL TRTN (PROC_ADDR, SHWE_RTN_P);
:/* ...
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DO I - 1 TO NUM NAME 2;
                                                                                                                                                  /+CHECK ATTRIBUTE +/
   END /*IF ENAME
                                                                                                               GO TO RIN: END;
                                                                                                                                                                                                                                                                                                                                                                                                                                                     LP - SHWE RIN P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RETURN;
END /+SHWE +/;
                                                                                                                                                                                                          THEN DO:
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FILE: SRCH

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SVC00360
SVC00370
SVC00380
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SVC00400
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SVC00540
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SVC00520
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         USERS; /*DCLS OF SEND PROTOCOLS OF THE CONTROL STRUCTURE*/
VPX; /*DCLS OF VP DATA STRUCTURES IN THE LOS*/
                                                                                 /*DETERMINE THE LEVEL TO WHICH THE PROCESS TO BE CREATED BELONGS*/
                                                                                                                                                                                                                     1. DETERMINE THE LEVEL TO WHICH THE PROC BELONGS TO:
2. DETRMINE THE TOTAL LENGTH OF MSG BY FOLLOWING CHAIN;
                                                                                                                                                                                                                                                                                                                                                                                         OUTPUT PARAMETERS: RIN_CODE: FIXED BIN, 1=NO SUCH PROC;
                                                                                                                 SVC SEND ROUTINE IN THE LOS, TO INSULATE APPLN PROGRAMS FROM THE HARDWARE COMM PROTOCOL SEND; THIS ROUTINE CREATES A NEW PROCESS AT THE PROPER LEVEL.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /+ DETERMINE THE TOTAL LENGTH OF MSG BY FOLLOWING MSG CHAIN+/
                                                                                                                                                                                                                                                                                                        INPUT PARAMETERS:
PROC_NAME: CHAR(7), NAME OF PROC TO BE CREATED;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PROC_NAME CHAR(7), (PTR,P) PTR,
(RTN_CODE,I,J) FIXED BIN(15);
1 ARG_LIST BASED (P), /*TEMPLATE OF MSG CHAIN*/
2 LEN FIXED BIN (15),
2 CBTP FIXED BIN (15),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DCL (LEVEL.VPID.BOXID,LEN) FIXED BIN, TYPE CHAR(1); XINCLUDE SVCTB; /*MACRO DEF OF PROC TABLE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DO P=PTR REPEAT P->ARG_LIST.PTR WHILE (P^=NULL());
                                                  DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DO I=1 TO PROC TBL LEN;
IF PROC TBL.N(I)=PROC NAME THEN J=I;
IF J^=0 THEN LEAVE;
SVCS1: PROC (PROC NAME, PTR, RTN CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF J=O THEN DO; /*NO SUCH PROC_NAME*/
                                                                                                  IT SERVES AS THE
                                                                                                                                                                                                                                                                                                                                      PTR: PTR, POINT TO MSG;
                                                                                                                                                                                                                                                                                                                                                                                                                                          CALLS PROCEDURES: SEND.
                                                  MODULE
                                                                                                                                                                                                                                                        CALL SEND.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 / *BEGIN PROCESSING * /
                                                                                                  PURPOSE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2 PTR PTR:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            XINCLUDE USERS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               XINCLUDE FDEBUG
                                                                                                                                                                                                        METHOD:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             KINCLUDE PFSVC;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RTN CODE=1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DCL PROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               KINCLUDE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RETURN.
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SVC00560	\$VC00580 \$VC00580	009000AS	SVC00610 SVC00620	SVC00630	\$VC00650 \$VC00650 \$VC00660
LEN-LEN + P->ARG_LIST.LEN; END;	/*SET UP SEND CALL+/ LEVEL=PROC TBL.LEVEL(J):	VPID=0; BOXID=1; TYPE='S';	ALLUCATE PF_SVC; PF_SVC.SVC = PROC_NAME;	PF_SVC.PTR = PTR;	RTN_CODE=0; /*0.K.*/ END /*SVCS1*/;

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /*DCLS OF SEND PROTOCOLS OF THE CONTROL STRUCTURE*/
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SVC SEND ROUTINE IN THE LOS, TO INSULATE APPLN PROGRAMS FROM THE HARDWARE COMM PROTOCOL SEND; THIS ROUTINE SENDS A MSG TO AN OLD PROCESS WHOSE ADDR IS PASSED AS
                                                                                                                                                                                                                                1. DETRMINE THE TOTAL LENGTH OF MSG BY FOLLOWING CHAIN;
                                                                                                                                                                                                                                                                                                          PROC_ADOR: (3) FIXED BIN, THE ADDR OF THE OLD PROCESS;
PTR: PTR, POINT TO MSG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DCL (LEVEL,VPID.BOXID.LEN) FIXED BIN. TYPE CHAR(1);
/* DETERMINE THE TOTAL LENGTH OF MSG BY FOLLOWING MSG CHAIN*/
                                                                                                                                                                                                                                                                                                                                                                                     OUTPUT PARAMETERS: RTN_CODE: FIXED BIN, 0= 0.K.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 XINCLUDE USERS; /+DCLS OF SEND PROTOCOLS OF THE CONT
XINCLUDE VPX; /+DCLS OF VP DATA STRUCTURES IN THE LOS+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LEVEL-PROC_ADDR.LEVEL;
VPID=PROC_ADDR.VPID; BOXID=PROC_ADDR.BOXID; TYPE='S';
CALL SEND (LEVEL, VPID, BOXID, TYPE, LEN, PTR );
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1 ARG LIST BASED (P). /+TEMPLATE OF MSG CHAIN+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DO P.PTR REPEAT P->ARG_LIST.PTR WHILE (P^=NULL());
                                                  DESCRIPTION
                                                                                                                                                                            TO THIS ROUTINE AS PROC ADDR
SVCS2: PROC (PROC ADDR, PTR, RTN CODE);
                                                                                                    IT SERVES AS THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (PTR,P) PTR.
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                                                  MODULE
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                                                                                                                                                                                                                                                                                                   INPUT PARAMETERS:
                                                                                                                                                                                                                                                2. CALL SEND.
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END /*SVCS2*/;
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                                                                                                       PURPOSE:
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                                                                                                                      MULL BUILTIN:
XINCLUDE AREP, ACRT, ADEFA, ADEFB, ADEFE, ADEFP, ADEL, AMINI, ANINI, ARET
XINCLUDE ARETE, ARETN, AUPDE, AUPDN, AVINI, AVNME, ASHWE;
XINCLUDE HEX;
XINCLUDE FEX;
DO WHILE (P~=NULL);
                                                                                                                                                                                                                                                (' SVC3: PTR ',HEX(P),' LEN',LEN,' TYP',CBTP)
(A.A(6),A,F(6),A,F(3));
                    /*** THIS IS A SERVICE ROUTINE TO FREE UP TOKEN LINK LIST *****/
/* TOKEN HAS BEEN REPRIEVED */
DCL 1 TOKEN BASED (P) .
2 LEN FIXED BIN(15).
2 CBTP FIXED BIN(15).
                                                                  2 CBTP FIXED BIN(15).
2 PTR PTR.
2 DATA CHAR (I REFER (TOKEN.LEN)); /*
                                                                                                            DCL (P.P1) PTR. (I, LEN, CBTP) FIXED BIN(15)
                                                                                                                                                                                         P1=TOKEN.PTR; /+SAVE NEXT PTR+/
CBTP=TOKEN.CBTP;
                                                                                                                                                                                                                                                                                                                                                                                                                                         P->DEL_RTN;
P->MINIT_ARG;
P->MINIT_RTN;
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P->RETN ARG;
P->RETN RIN;
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P->RETE RTN;
P->RETE ARG1;
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P->DEFP ARG:
P->DEFP RIN:
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                                                                                                                                                                                                                                                                                                                                      P->DEFA_ARG;
P->DEFA_RTN;
P->DEFB_ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P->NINIT RIN;
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P->DEFE_ARG;
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P->UPDE_RTN;
                                                                                                                                                                                                                                                                                           P->REP_ARG;
P->REP_RTN;
P->CRT_ARG;
P->CRT_RTN;
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P->RET_RIN;
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THEN PUT SKIP EDIT('
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SVC3:PROC(P);
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WHEN( 17)
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WHEN(20)
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WHEN( 13)
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                                                                                                                                                                 OTHERWISE DO; PUT SKIP LIST ('***SVC3 WARNING', CBTP); SIGNAL ERROR; END; END;
                                                                                                                                                                                                                                                             **** SVC3: END') (A);
WHEN(34) FREE P-SUPDN_ANG;
WHEN(32) FREE P-SUNIT_ANG;
WHEN(33) FREE P-SUNIT_ANG;
WHEN(34) FREE P-SUNIT_RTN;
WHEN(34) FREE P-SUME_ANG;
WHEN(35) FREE P-SYME_RTN;
WHEN(37) FREE P-SYME_RTN;
WHEN(37) FREE P-SYME_RTN;
WHEN(38) FREE P-SYME_RTN;
WHEN(39) FREE P-SYME_RTN;
                                                                                                                                                                                                                                                           IF FDEBUG. LEVO THEN PUT EDIT('
                                                                                                                                                                                                                                                                                          RETURN;
END /+SVC3+/;
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TBEG: PROC (PROC\_ADDR,P);

TBE000 to	18E00020 18E00030	18£00050 18£00060 18£00060	TBE00080 TBE00090	TBE00100 TBE00110	TBE00120 TBE00130	TBE00140 TBE00150 TBE00160
IBEG: PRUC (PROC_ADDR,P);	/**** A SERVICE ROUTINE TO STRIF OFF MSG TOKEN FROM A CALLING *** *** ARGUMENT LIST; IT IS USED BY A T-PROC WHEN IT IS INVOKED ***/	/**** PROC_ADDR CONTAINS THE PROC_ADDR OF THE CALLING PROCEDURE, *** *** P WILL PONT TO THE FIRST TOKEN OF THE CALLING ARGUMENT LIST. +/	DCL P PTR; XINCLUDE USERS VPX FDERIG FENCE	PROC_ADDR=THISVP->VP.WAIT.MSG->MSG.RIN_ADDR; P= THISVP->VP.WAIT.MSG->MSG.RIN_ADDR;	FREE THISVP->VP.WAIT.MSG->MSG; /+FREE MSG+/	END;

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                                                                                                                                                                                        /* FTIME IS TIMING REPORT OPTION */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                                                                                                                                                                                                                                                                                       IF FTCALL(I) /* IF TCALL TRACE BIT FOR THAT LEVEL IS ON*/
THEN PUT SKIP EDIT ('TCALL: ',PROC NAME)(A,A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Efime(enum)=ETIME(ENUM)+BEGTIME;/* ACCUMULATE TOTAL TIME +/
ECOUNT(ENUM)=ECOUNT(ENUM)+1;/* ACCUMULATE COUNT +/
ELO(ENUM)=ELO(ENUM)+LOTIME;/* ACCUMULATE LOWER LEVEL PROC TIME +/
FREE LOTIME; IF ALLOCATION(LOTIME)^* O THEN LOTIME=LOTIME+BEGTIME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        •
                                                                                                                                                                   /* FTCALL IS DEBUG TRACE BIG
                                                                                **** TOKEN OF THE CALLING ARGUMENT LIST;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (ECOUNT(50), ELD(50), ETIME(50)) FIXED BIN(31) EXT INIT((50)0);
ICALL:PROC (PROC NAME,I,RP,TP) RECURSIVE;
/*** A SERVICE ROUTINE FOR CROSS-LEVEL PROCEDURE CALLS*/
/*** PROCE NAME IS THE NAME OF THE PROCEDURE TO BE INVOKED; ***
**** I IS THE BOX ID TO WAIT ON; RP POINTS TO THE BEGINNING ***
                                                                                                                          **** LISI WHEN THE CALLED PROCEDURE RETURNS ***************
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /* CALLED PROC RETURNS
                                                                                                                                                                                                                                                                                                                                     /* FIND ENUM AND LEVEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CALL SVCS1 (PROC_NAME.P.RIN_CODE);
IF RIN_CODE ~=0 THEN PUT SKIP LIST ('ERROR IN SVC SEND TO
                                                                                                                                                                                                                                             DCL (RP.P.TP) PTR; DCL MULL BUILTIN, I FIXED BIN; XINCLUDE USERS, VPX, FDEBUG, ESVCS; DCL RIN_CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                        IF ARCH. PROCNAME (ENUM) - PROC_NAME THEN LEAVE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MSG.PTR*RP; /+CMAIN TO ROOT PTR OF ARG LIST+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MSG.RTN ADDR.LEVEL=THISVP->VP.LEVEL;
MSG.RTN ADDR.VPID=THISVP->VP.VPID;
MSG.RTN ADDR.BOXID=1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TP-THISVP->VP.WAIT.MSG->MSG.PTR;
                                                                                                                                                                 DCL FTCALL(4) BIT(1) STATIC EXT;
DCL FTIME BIT(1) EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ë
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ALLOCATE LOTIME: LOTIME=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      BEGTIME -RTIMER-BEGTIME;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PROC NAME);
                                                                                                                                                                                                                                                                                                                                                                                                I = ARCH. LEVEL (ENUM)
                                                                                                                                                                                                                                                                                                                                     DO ENUM = 1 TO 18;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IF FILME THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF FTIME THEN DO;
                                                                                                                                                                                                             XINCLUDE FSTRUC;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CALL WAIT (1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ALLOCATE MSG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    BEGTIME =RTIMER
                                                                                                                                                                                                                                                                                                                                                                             EZO:
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/	
/**************** TCALL TRACE ************************************	TCA00570 TCA00580
IF FICALL (I) THEN PUT EDIT ( *** ', PROC_NAME, ' RETURNS') (A,A,A);	TCA00590
	TCA00600
	TCA00610
TARK TALOVE AVE. TALOVE AVE.	TCA00620
RELUKAN.	TCA00630
END / *ICALL*/;	TOACORAC

FILE: 1m (N PLIOPT A1

TRT00010	_	1RT00040	1R100050	TRT00060	IN TRT00070	, TRT00080	TRT00090	TR100100	TRT00110	TR100120	TRT00130	TR100140	TRT00150	TRT00160	TRT00170	TRT00180	18100190	1RT00200	TR100210	TRT00220	TRT00230
TRIN: PROC(PROC_ADOR, RTP);	/**** A SERVICE ROUTINE USED BY A T-PROC WHEN IT FINISHES PROCESSIN	**** IT ADDS A MSG TOKEN TO A RETURN ARGUMENT LIST AND CALLS SVCS2	/*** AND THEN FINISHES ITSELF ****		/*** PROC ADDR CONTAINS THE ADDRS OF THE CALLING PROCEDURE TO RETURE	*** THE RETURN MSG TO: RTP POINTS TO THE RETURN ARGUMENT LIST ***/			*INCLUDE USERS.VPX.ESVCS.FDEBUG:	DCL (P.RTP) PTR, RTN CODE FIXED BIN;	OCL 1 BASED (P).	2 LEN FIXED BIN (15):		ALLOCATE MSG:	MSG PIR ATP: /*CHAIN TO ROOT PIR OF ARG LIST*/	MSG.RIN ADDR. LEVEL=THISVP->VP.LEVEL: /*RIN ADDR NOT IMPORTANT**/	MSG. RIN ADDR. VPID THISVP ->VP VPID:	MSG.RIN ADDR. BOXID#1: /*ALWAYS USE BOX 1*/	CALL SVCS2 (PROC ADDR.P.RTN CODE);	CALL FINISH: /+COMMIT SUICIDE+/	END /+TRIN+/;

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PLIOPT

FILE: UPCT

249

RETURN; END;

FILE: UPUE

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                                                                                                                                                                       (N.NODE) FIXED BIN;
(P.TP.RP.LP.TP1.RTP.EP.EP1)PTR, NULL BUILTIN;
(RIN CODE.I) FIXED BIN, NUM FIXED BIN (31);
BDATA BIT (320), CDATA CHAR (40), DLEN FIXED BIN;
TO BIT FIXED BIN INIT (1), TO CHAR, FIXED BIN INIT (2);
TO BIT CHK FIXED BIN INIT (3);
(ENAME, ANAME, ENAME) CHAR (8);
(ENAME, ANAME, ENAME) CHAR (8);
1 MAINFO (25), /*AN ARRAY OF AINFO TO STORE RETRIEVED ACAT ENT*/
2 BSETID BIT (32), /*BSETID OF THIS ATTRIBUTE**/
2 PSETID BIT (32), /*PSETID OF TARGET NODE**/
2 ENAME CHAR (8),/*IF TARGET IS A ENTITY SET*/
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /**ALLOCATE ROOT NODE**/
CALL GECT (ENAME,EINFO,RIN_CODE); /*GECT GETS ENTITY CAT ENTRY
IF RIN_CODE ^= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /*BEGIN PROCESSING**/
CALL TBEG (PROC ADDR.P);
ALLOCATE UPDE RTN SET (RTP);
RTP->UPDE RTN.RTN_CODE=0; /*INIT TO 0.K.*/
ENAME=UPDE_ARG.NAME; ROOT OP=UPDE_ARG.OP; /* REMEMBER ROOT OP
MAINFO.ENAME(!)=ENAME; /*INIT AINFO ARRAY'S FIRST TOKEN*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RIP->UPDE_RIN.RIN_CODE = 100; /**100 IS NO SUCH ENTITY**/
CALL TRIN (PROC_ADDR.RIP); /**RETURNS**/
                                                                                            XINCLUDE EGECT,EGACT,EVTPE;
XINCLUDE EALLA; /* USES S-PROC ALLA TO OBTAIN ALL ATTRS */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DO PHUPDE ARG.PTR REPEAT P->UPDE ARG.PTR WHILE (P^HULL);
ALLOCATE UPDN ARG SET (TP); /* ALLOCATE UPDN TOKENS +/
LP->UPDN ARG.PTR=TP; LP=TP;
TP->UPDN ARG=UPDE ARG, BY NAME;
TP->UPDN ARG=UPDE ARG, BY NAME;
TP->UPDN ARG-CBTP=RP->UPDN ARG.CBTP; /*FIX UP CBTP+/
                                                         XINCLUDE AUPDE, FDEBUG, SERVICE, AUPON, ARETE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TP->UPON ARG.OP=UPOE ARG.OP;
TP->UPON ARG.PSETID=EINFO;
                                      **I-PROC TO PROCESS UPDE **/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALLOCATE UPDN_ARG SET (TP);
                                                                                                                                                                                                                                                                                                                                                                                           MAX FIXED BIN (31),
                                                                                                                                                                                                                                                                                                                                                                                                                 MIN FIXED BIN (31).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ROOT OP FIXED BIN;
                                                                                                                                                         ANAMES(25) CHAR (8);
                                                                                                                                                                                                                                                                                                                                                                                                                                    MLEN FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*FOLLOW UPDE TREE **/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TYPE CHAR (1), VIYPE CHAR (1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                        FUNC CHAR(1)
                                                                             DECAT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RP, LP=TP;
UPDE : PROC:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     THEN DO:
                                                                           XINCLUDE
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ANAME = UPDE ARG.NAME;
CALL GACT (ANAME, ENAME, AINFO, RIN_CODE); /*GACT GETS ATTR CAT ENT*/
IF RIN_CODE^*0
                                                                                                       RTP->UPDE_RTN.RTN_CODE=NODE+100; /+100+ IS NO SUCH ATTRIBUTE+++/CALE SVC3 (RP); /+FREE UP UPDN ALLOCATION UP TO NOW+/CALL TRIN (PROC_ADDR, RTP); /+RETURNS++/
                                                                                                                                                                                                                                                                                                                                                                                     IF UPDE_ARG.PARENT ^= 1 THEN /* FOR ALL ATTR'S NOT DIRECT Y RELATED TO ROOT NODE */
                                                                                                                                                                                                                                                                                           TP->UPDN_ARG.OP=UPDNOP.CI;
TP->UPDN_ARG.OP=UPDNOP.OD;
TP->UPDN_ARG.OP=UPDNOP.REPP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            THEN DO; /*PROBLEM DATA, KEY VIOLATION*,
                                                                                                                                                                                                                              /*TRANSFORM UPDE UP CODE INTO PROPER UPDN OP CODE*/
IF AINFO.TYPE='V' & UPDE_ARG.PARENT = †
THEN DO;
                                                                                                                                                                                    MAINFO(NODE)=AINFO; /*ENTER INTO AINFO ARRAY*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WHEN (UPDNOP. CI, UPDNOP. REPP.) DO;
ALLOCATE RETE_ARG SET (EP);
           NODE "UPDE ARG. NODE;
ENAME 1=MAINFO. ENAME (UPDE ARG. PARENT);
                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF AINFO.TYPE='V' & UPDE ARG DLEN-=O
THEN DO:/+WHEN THERE IS VAL+/
                                                                                                                                                                                                                                                                                                                                                                                                                  TP->UPDN_ARG.OP=UPDNOP.ID;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*CHECK FOR UNIQUENESS OF KEY*/
IF AINFO.FUNC*'K'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SELECT (TP->UPDN ARG.OP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IF FDEBUG. LEVI
                                                                                                                                                                                                                                                                                                                                                                                                                                                  /*VERIFY UPDATE DATA ***/
- NULL:
                                                                                                                                                                                                                                                                                                                          WHEN (UPDEOP. REP)
                                                                                                                                                                                                                                                                                            WHEN (UPDEOP.IST)
WHEN (UPDEOP.DEL)
                                                                                                                                                                                                                                                                              SELECT (UPDE_ARG. OP)
                                                                                                                                                                                                                                                                                                                                                        END /* 1F V */;
TP -> UPON ARG. PTR
                                                                                                                                                                                                                                                                                                                                           OTHERWISE:
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                   RTP->UPDE_RTN.RTN_CODE=300+UPDE_ARG.NODE;
/*** RTN_CODE_300+ IS VIOLATION OF KEY CONSTRAINT*/
CALL SVC3 (EP); CALL SVC3 (EP1); CALL SVC3 (RP);
CALL TRIN (PROC_ADDR.RTP);
                                                                                                                                                                                                                                                                                                                                                                                      RTP->UPDE_RTN.RTN_CODE=NODE; /*1+ IS ILLEGAL NODE DATA*/
CALL SVC3(RP); /*FREE UP UPDN ALLOCATION UP TO NOW*/
CALL TRIN (PROC_ADDR, RTP); /*RETURNS*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /* FIX UP THE DELETE ENTITY (DEE) OPERATION TO INCLUDE DELETION
THEN PUT SKIP LIST ('(UPDE) KEY VIOLATION');
                                                                                                                                                                                                                                                                       /*CHECK DATA TYPE AND NUMERIC LIMITS*/
CDATA=UPDE_ARG.CDATA;
DLEN=UPDE_ARG.DLEN;
CALL VIPE (AINFO.TO_BIT_CHK,BDATA.CDATA,DLEN,RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL ALLA (ENAME, ANAMES, N, RTN CODE);
NODE = LP->UPDN_ARG.NODE; /* LP POINTS TO THE LAST TOKEN
IN THE UPDN_ARG CHAIN ALLCATED BY CALLER */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*REPLACE ANAME WITH PSETID AND BSETID AND FIX UP DATA**/
TP->UPDN_ARG.PSETID=AINFO.PSETID;
TP->UPDN_ARG.BSETID=AINFO.BSETID;
IF AINFO.TYPE='V' & UPDE_ARG.DLEN^=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL GACT (ANAMES (I), ENAME, AINFO, RTN_CODE);
ALLOCATE UPDN_ARG:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LP->UPDN ARG.PTR= P:LP = P;
UPDN ARG.PSETID = AINFO.PSETID;
UPDN_ARG.BSETID = AINFO.BSETID;
UPDN_ARG.DLEN = O;
UPDN_ARG.PARENT = 1; /* ALWAYS ROOT NODE */
                                                                                                                     END /*RIN_CODE CHK+/;
                                                                                                                                                           END /*1ST OR REP*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   END /*DO P=UPDE_ARG.PTR...*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /*NERIFY DATA*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TP->UPDN_ARG.DATA-BDATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TP->UPDN_ARG.DLEN=DLEN;
                                                                                                                                                                                                                                                                                                                                                                      THEN DO: /*PROBLEMS**/
                                                                                                                                                                                                 END /+SELECT+/;
                                                                                                                                                                                                                                   END /*FUNC='K'*/:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      OF ALL ITS ATTRIBUTES +/
                                                                                                  RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF ROOT_OP = UPDEOP.DEE
                                                                                                                                                                               OTHERWISE:
                                                                                                                                                                                                                                                                                                                                                    IF RTN CODE -= 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DO 1 - 1 10 N;
                                                                                                                                                                                                                                                                                                                                                                                                                                                 RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   THEN DO:
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PL 10PT

FILE: UPDE

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UPD01660
UPD01690
UPD01690
UPD01700
UPD01710
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UPD01730
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UPD01770
UPD01780
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UPD01880
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UPD01810
                                                                                                                                                                       RTP->UPDE_RTN.RTN_CODE*1+200; /+200+ IS RTN CODE FROM UPDN++/
UPDN_ARG.NODE = NODE + I;
IF AINFO.TYPE = 'V'
THEN UPDN_ARG.OP = UPDNOP.DD;
ELSE UPDN_ARG.OP=UPDNOP.DEL;
END /* DO I */;
END /* IF DEE */;
                                                                                            /*CALL UP UPDN **/
CALL TCALL ('UPDN',1,RP,TP);
                                                                                                                                                                                                         CALL SVC3 (RP);
CALL SVC3 (RP);
CALL TRTN (PROC_ADDR, RTP);
RETURN;
                                                                                                                                  /*CHECK RETURNS*/
I*TP->UPDN_RTN.RTN_CODE;
IF I^=0 THEN
                                                                                                                                                                                                   /*RETURNS***/
                                                                                                                                                                                                                                                                              END /*UPDE*/;
```

***************************************	UP000020
WOLLDIGGE SHOWN	UPD00030
*	11900050
	UPD00060
	UPD00070
**** THIS MODULE IS THE T-PROC AT THE N-ARY LEVEL WHICH	UPD00080
**** PERFORMS UPDATES IN THE DATABASE; IT ACCEPTS UPDATE	UPD00090
**** REQUESTS IN A TREE FORM (UPDN TREE), RESOLVES PREDICATES	UPD00100
••••• ON OCCURENCES TO BE UPDATED, AND CALLS SUBROUTINES TO	UPD00110
PERFORM CRT, DEE AND MOD TYPES OF UPDATES.	UPD00120
•	UPD00130
	UPD00140
***** 1. MAKE A PASS THROUGH THE UPON TREE TO FILL UP A TEMP	UPD00150
MHICH MAVE TO CHAID ANDER.	119000170
2. USE TEMP, WORKING FROM	UPD00180
RESOLVE ALL PREDICATES (I.E. ID OPS) ON THE	UPD00190
LEMENTS TO BE	UPD00200
UPDN TREE TO A 2-LEVEL	UPD00210
3. PASS THE REDUCED TREE TO	UPD00220
	UPD00230
11001	UPD00240
COLOR DAYANTERXO:	119000250
•	119000270
	UPD00280
***** AS INDICATED IN UPDN_RTN;	UPD00290
***************************************	UPD00300
u	/ UPD003 to
	UPD00320
/*** CALLS FUCEDURES:	UPD00330
INTRA-LEVEL	
UDE AREIN:	_
/**** INTRA-LEVEL S-PROC: MODN, CRIN, DELN;	Ξ
RTN, EDELN;	UPD00380
	_
XINCLUDE SERVICE, FDEBUG;	UP000400
	UPD00410
DCL (P.TP,RP,RTP,LP,MP) PTR;	UPD00430
D BIN:	UPD00440
NULL BUILTIN;	UPD00450
DCL 1 TEMP (20), /*TEMP STRUCTURE, PARENT NODE# CAN BE UP TO 20*/	UPD00460
2 K TIKED BIN,	UPD00470
10P (5)	UP000480
<u>ٔ</u> ۔	UPD00500
DCL OFF_NODE(25) BIT(1) INIT ((25)('0'B));	UPD00510
DCL NPTR(25) PTR;	UPD00520
/ * CIT 5 5 5 CO CO TEL C 5 G * /	UPD00530
/+BEGIN FRUCESSINGE	UF000340
CALL TREG (PROC ADDR. BP):	

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UPD00780
UPD00790
UPD00570
                     UPD00580
                                       UPD00590
                                                          UPD00600
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /*FIRST MAKE A PASS THROUGH UPDN ARG TREE TO FILL UP TEMP STRUCTURE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /************ UPDN REQUEST TRACE ****************************
                                                                                                                                                                                                                                                                                          PUT SKIP EDIT('NODE *PSETID* PARENT OP DLEN +BSETID* DATA')(A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IF FDEBUG.LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RIN' , RTP->UPDN_RIN.RIN_CODE);
                                                                                                                                                                                                                                                                                                                                DO P=MP REPEAT P->UPDN ARG.PTR WHILE (P^=NULL);
PUT SKIP EDIT(UPDN ARG.NODE, HEX4(ADDR(UPDN_ARG.PSETID)->BP),
UPDN ARG.PARENT, UPDN ARG.OP,
UPDN ARG.DLEN,''')(F(4),X(1),A(8),F(4),F(6),F(4),A);
IF UPDN_ARG.PARENT^=0 THEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NPTR(UPDN_ARG.NODE) = P; /* SAVE POINTER OF NODE TOKEN */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             N = UPDN ARG.PARENT; /* INDEX TEMP BY PARENT NODE # +/ IF N > 2\overline{O} /* TEMP ARRAY OVERFLOW +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RTN , RTP -> LIPDN RTN. RTN CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DO 11=1 TO UPDN ARG.DLEN/4;DCL II FIXED BIN;
PUT EDIT(HEX4(ADDR(UPDN ARG.DATA)->PAA(II)))(A(B));
XINCLUDE HEX; DCL BP PTR BASED;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DCL PAA(10) PTR BASED
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DO P=MP REPEAT P->UPON ARG.PTR WHILE (P^=NULL);
                                                          /+TREE REDUCTION--REMOVE ALL 'ID' NODES*/
DO N = 1 TO 20; /+INITIALIZE TEMP STRUCTURE*/
TEMP.K(N) = 0;
                                                                                                                                                                                                                                                                                                                                                                                                                               PUT EDĪT(HEX4(ADDR(UPDN ARG.BSETID)->BP),'') (\bar{A}(B),A);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                THEN DO; /* TEMP IDN OVERFLOW */
RTP->UPDN_RTN.RTN_CODE=2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RTP -> UPDN RIN. RIN CODE = 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TEMP.K(N) = TEMP.K(N) + 1;
 ALLOCATE UPDN_RTN SET (RTP);
                                                                                                                DO J = 1 TO 5;
TEMP.IDN(N,J) = 0;
TEMP.IDP(N,J) = NULL;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IF TEMP.K(N) > 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GO TO RIN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GO TO RTN;
                                                                                                                                                                                                                                                    DCL FFFN BIT (1) EXT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ELSE PUT EDIT("
                                                                                                                                                                                                                                                                           IF FFFN THEN DO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THEN DO
                                                                                                                                                                                <u>..</u>
                       LP-NULL;
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                                                                                                                                                                                                                                          OFF_NODE(UPDN_ARG.NODE) = '1'B; /* MARK NODES OFF TREE +/
END /* IF UPDN_ARG.OP */;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RTP->UPDN_RIN.RIN_CODE=4;
IF FDEBUG.LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RIN ,RIP->UPDN RIN.RIN_CODE);
CALL SVC3 (TP); /*FREE RIN MSG CHAIN*/
GO TO RIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ****** PARENT NODE WHICH HAS AN ILLEGAL IDENTIFICATION TREE*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ******
                                                                                                                RTP->UPDN_RTN.RTN_CODE=3;
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RTN
, RTP->UPDN_RTN.RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              I : ALLOCATE REIN ARG;

I > - NETN ARG. PTR = P;

RETN ARG. NODE = 1 + 1;

RETN ARG. PSETID = IDP(N, J) -> UPDN ARG. PSETID;

RETN ARG. BSETID = IDP(N, J) -> UPDN ARG. BSETID;

RETN ARG. PRED. DLEN(1) = IDP(N, J) -> UPDN ARG. DATA;

RETN ARG. PRED. DATA(1) = IDP(N, J) -> UPDN ARG. DATA;

RETN ARG. GET = RETNGET. NO;

RETN ARG. GET = RETNGET. NO;

RETN ARG. GET = RETNGET. NO;

RETN ARG. PRED. CN(1) = 1;

RETN ARG. PRED. OP(1) = RETNOP. EQ;
                                                                                                                                                                                                                                                                                                                                               /*FOR EACH PARENT NODE IN TEMP CALL RETN TO 'PIN POINT' THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REIN ARG.GET = RETNGET.ALL;
REIN ARG.PSETID = NPTR(N)->UPDN ARG.PSETID;
DO J = 1 TO TEMP.K(N); /+FOR EACH OF ITS CHILD NODE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                  I = 0; /*NO PRED FOR ROOT NODE*/ ALLOCATE RETN_ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF TP->RETN_RTN.N^=1 THEN DO ; /******RTN CODE 10+N REPRESENTS THE NODE NUMBER OF A
                                                                                                                                                                                                                                                                                                                                                                                  DO N = 20 TO 1 BY -1; /*WORKS FROM THE END NODES UP*/
IF TEMP.K(N) ^= 0
                                   TEMP.IDN(N,TEMP.K(N)) = UPDN_ARG.NODE;
TEMP.IDP(N,TEMP.K(N)) = P;
IF LP=NULL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALL TCALL ('RETN', 1,RP,TP);
CALL SVG3(RP); /*FREE CALLING ARG LIST*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /+CHECK NUMBER OF ELEMENTS RETURNED+++/
                                                                                                 THEN DO; /* ILLEGAL ROOT */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /***** CALL UP RETN ******/
                                                                                                                                                                                                                                                                                                                                                                    OCCURRENCE OF THE NODE *****
                                                                                                                                                                                  GO TO RIN;
                                                                                                                                                                                                                                                                                                          END /* 00 P = P */:
                                                                                                                                                                                                     END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TP,RP = P;
END:
                                                                                                                                                                                                                                                                                     ELSE LP=P;
                                                                                                                                                                                                                         ELSE;
                                                                                                                                                                                                                                                                                                                                                                                                                                    THEN DO:
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UPD01720
UPD01730
                        UPD01670
                                             UPD01680
                                                                 UPD01690
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     UPD01660
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RTP->UPDN_RTN.RTN_CODE=N+10;
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RTN RTP->UPDN_RTN.RTN_CODE);
CALL SVC3(TP); /*FREE RTN MSG CHAIN*/
                                                                                                                                                                                                                                                                                                                     /**PERPURM UTCO...

SELECT (UPDN ARG.OP);
WHEN (UPDNÖP.CRT) CALL CRTN (P.OFF NODE,RTN_CODE);
WHEN (UPDNOP.DEE) CALL DELN (P. OFF NODE,RTN_CODE);
WHEN (UPDNOP.MOD) CALL MODN (P. OFF NODE,RTN_CODE);
WHEN (UPDNOP.MOD) CALL MODN (P. OFF NODE,RTN_CODE);
OTHERWISE DO ; /*RTN CODE 31 IS ILLEGAL ROOT NODE OP********/
RTP->UPON_RTN.RTN_CODE**31;
If FDEBUG.LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RTN 'RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF RIN CODE -* O THEN DO; /*RIN CODE 40+ IS FROM SUBR CALL **
                                                                                                                                                                                                                                                                           /*IN CURRENT VERSION BY NOW THE UPDN TREE HAS BEEN REDUCED TO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RIP->UPDN RIN.RIN CODE*RIN CODE+40;
IF FDEBUG_LEV2 THEN PUT SKIP LIST ('(UPDN) ERR RIN
RIP->UPDN_RIN.RIN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /*****CHECK SUBROUTINE RIN CODE ******/
                                                                                                                                            NPTR(N)->UPON ARG.OLEN-P->RETN RTN1.DLEN:
NPTR(N)->UPON ARG.DATA-P->RETN RTN1.DATA;
CALL SVC3(TP): /+FREE RTN MSG LIST+/
END /+IF TEMP.K+/;
                                                                                                                                                                                                                                                                                              2-LEVEL TREE WITHOUT ID NODES *****/
                                                                                                                              P*TP->RETN RTN.PTR; /*GET RETN DATA*/
                                                                                                                                                                                                                                                                                                                 DaMP.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RTN: CALL TRIN(PROC ADDR, RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /**SET UP RTN MSG****/
                                                                                      GO TO RTN:
                                                                                                                                                                                                                                                                                                                 /**PERFORM UPDATES****/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             END /+SELECT++/;
                                                                                                           ËŽ
                                                                                                                                                                                                                                  END /**N*/:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              END /*UPDN*/:
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DUMO0050
DUMO0060
DUMO0070
DUMO0080
DUMO0090
DUMO0090
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DUMOO 180
DUMOO 190
DUMOO 200
DUMOO 210
DUMOO 220
DUMOO 230
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DUMO0270
DUMO0280
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DUMO0150
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DUMO0300
DUMO0310
DUMO0320
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DUMO0350
DUMO0360
DUMO0370
DUMO0380
DUMO0390
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DUMOO460
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DUMO0420
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DUMOO540
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RIN_CODE=1; /***** 1 -- ILLEGAL ESET OP ****/
PUT_SKIP LIST ('ILLEGAL SEMANTICS OF MODIFICATION STATEMENT');
CALL SVC3(RP);
                             *** SUBROUTINE TO GET DATA FROM USER AND BY MAKING USE OF
***** THE T.OPE.OP DATA STRUCTURES PASSED TO IT FROM THE CALLER
***** ABLE TO GENERATE PROPER CALL TO UPDE AT THE NEXT LEVEL **/
                                                                                                                                                                                                                                                                                                                                 DCL N FIXED BIN , /*SERVE AS TOKEN COUNT*/ I FIXED BIN;
                                                                                                         /+DATA STRUCTURE OF NAMES +/
                                                                                                                                                                                                                                                                                                                                                                                                                                              IF T1.PARENT(I)~=0 THEN NA(T1.PARENT(I))='1'B;
                                                                                                                                                                                                                                                                                                    D CHAR(40),
L FIXED BIN; /*LENGTH OF TOKEN*/
                                                                                                                           2 ENAME CHAR(8),
2 TN FIXED BIN, /+MUMBER OF ATTR+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WHEN('M') UPDE_ARG.OP=UPDEOP.MOD;
WHEN ('C') UPDE_ARG.OP=UPDEOP.CRT;
WHEN('D') UPDE_ARG.OP=UPDEOP.DEE;
OTHERWISE DO;
                                                                                                                                                                                                                      (OP(25), OPE) CHAR(1);
(P.RP.LP.TP) PTR, NULL BUILTIN;
CODE FIXED BIN, K FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CALL LEX (N.TOKEN,O.RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DO WHILE ('1'B); /+DO FOREVER+/
UPE1: PROC (OPE, T. OP, RTN_CODE);
                                                                                            XINCLUDE AUPDE, SERVICE, ELEX;
                                                                                                                                                                                                                                                                                                                                                                  /+INITIALIZE NA STRUCTURE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  END /*SELECT*/;
K=0; /*INIT DATA COUNT*/
                                                                                                                                                          2 T1 (25),
3 PARENT FIXED BIN,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /*ALLOCATE ROOT NODE**/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UPDE_ARG.NAME=T.ENAME;
SELECT (OPE);
                                                                                                                                                                                        3 ANAME CHAR (8);
                                                                                                                                                                                                       RTN CODE FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ALLOCATE UPDE_ARG;
LP,RP=P;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                      NA(25) BIT(1);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF RTN CODE^=0
                                                                                                                                                                                                                                                                                     1 TOKEN (25)
                                                                                                                                                                                                                                                                                                                                                                                                 NA(I)='0'B;
                                                                                                                                                                                                                                                                                                                                                                                 DO I*1 TO 25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                               DO 1=1 TO TN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                THEN DO:
                                                                                                                                                                                                                                                                                                                                                                                                                  ENO:
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FILE: UPE1

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DUMO0780
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DUMOOB 20
DUMOOB 30
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                                                                                                                                                                                                                                                                                   RTN CODE=2;
PUT SKIP LIST ('ILLEGAL SEMANTICS OF MODIFICATIOL STMT.');
CALL SVC3(RP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /* CHECK UPDE RTN CODE: IGNORES 100-200 RANGE
                                                                                                                                                                                                                                                                                                                                                                                                                                       PUT SKIP LIST ('INSUFFICIENT DATA; REENTER LINE');
CALL SVG3 (RP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PUT SKIP LIST ('ILLEGAL SYNTAX, PLEASE RE-ENTER LINE');
GO TO A; END;
                                                                                                            ALLOCATE UPDE_ARG;
LP->UPDE_ARG.PTR=P; LP=P;
UPDE_ARG.NODE=1+1; /*ASSIGN NODE NUMBER*/
UPDE_ARG.PARENT=T1.PARENT(I)+1;
UPDE_ARG.NAME=T1.ANAME(I);
SELECT (OP(I));
                                                                                                                                                                                                                                                                                                                                                                                                 NA(1)='0'B THEN DO; /*FILL IN DATA*/
                                                                                                                                                                                                        WHEN ('1') UPDE ARG.OP=UPDEOP.ID;
WHEN ('N') UPDE ARG.OP=UPDEOP.IST;
WHEN ('D') UPDE ARG.OP=UPDEOP.DEL;
WHEN ('R') UPDE ARG.OP=UPDEOP.REP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                THEN PUT SKIP LIST ('KEY VIOLATION');
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /*FREE RETURN LIST*/
                                                IF N=O THEN LEAVE; /*NO MORE DATA*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /*ALL NODES ARE ALLOCATED*/
CALL TCALL ('UPDE', 1,RP,TP);
CALL SVC3 (RP); /*FREE ARG LIST*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        UPDE_ARG.CDATA=TOKEN.D(K);
UPDE_ARG.DLEN=TOKEN.L(K);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             END /* RIN CODE CHECK */;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CODE = TP - > UPDE_RTN. RTN_CODE;
                                                                                /*FILL UP UPDE REQUEST*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ELSE IF CODE > 200
                                                                                                                                                                                                                                                                                                                                                                   END /+SELECT+/;
                                                                                                                                                                                                                                                                                                                                                                                                                               IF K>N THEN DO;
                                                                                                                                                                                                                                                                       OTHERWISE DO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GO TO END:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1F CODE > 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          END /+DO 1+/:
                                                                                                                                                                                                                                                                                                                                   RETURN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /+DO WHILE+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALL SVC3 (TP);
                                                                                               DO I-1 TO TN;
                                                                                                                                                                                                                                                                                                                                                                                                                  X=X+1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IF CODE -=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    THEN DO:
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FILE: UPE1 PLIOPT A1

RETURN; END /+UPE1+/;

PLIOPT

FILE: USER

USER: PROC

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VER00040
VER00050
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VEROCO90
                                  VER00030
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                                  /*A S-PROC IN THE N-ARY LEVEL TO VERIFY AND CONVERT DATA ***/
                                                                XINCLUDE DPCAT, DBEU;
XINCLUDE EPCT, ESUB1;
DCL BDATA BIT (*) VAR ALIGNED,
VOP BIT(8) ALIGNED, RTN CDDE FIXED BIN, YES BIT(1) ALIGNED;
DCL PTYPE CHAR (1), BDATA! BIT (320) VARYING;
DCL (NUM, NUM!) FIXED BIN (31);
DCL 1 OP ALIGNED, /* SAME AS RETNOP */
2 EQ BIT (8) INIT ('OOCOCOO'8),
2 EQ BIT (8) INIT ('OOCOCOO'8),
2 LT BIT (8) INIT ('OOCOCOO!0'B);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RTN_CODE=3; /****3 IS ILLEGAL OP*******/
RETURN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WHEN (OP.EQ) IF BDATA!=BDATA THEN YES='1'8; WHEN (OP.GT) IF BDATA!>BDATA THEN YES='1'8; WHEN (OP.LT) IF BDATA!<BDATA THEN YES='1'8;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WHEN (OP.EQ) IF NUM1=NUM THEN YES='1'B;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WHEN(OP.GT) IF NUM1>NUM THEN YES='1'B;
WHEN (OP.LT) IF NUM1<NUM THEN YES='1'B;
OTHERWISE DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RTN CODE=3; /***3 IS ILLEGAL OP*/
RETÜRN;
VERIF: PROC(PINFO,P, VOP, BDATA, RIN_CODE, YES);
                                                                                                                                                                                                                                                                                                                                                                                                                                         WHEN('N') DO; /+CONVERSION+/
PUT SKIP LIST ('(VERIF), WHEN N');
UNSPEC(NUM)+BDATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*NO CONVERSION*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               UNSPEC (NUM1)=BEU.DATA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /*SELECT OP*/;
END /*OTHERWISE*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END /*SELECT OP*/;
                                                                                                                                                                                                                                                         DCL P PTR, NULL BUILTIN;
DCL UNSPEC BUILTIN;
                                                                                                                                                                                                                                                                                                                             YES='0'B; /+INIT TO NO+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                END /*SELECT PTYPE*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           BOATA 1-BEU. DATA;
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      END /*WHEN N*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SELECT (VOP);
                                                                                                                                                                                                                                                                                                              /*BEGIN PROCESSING*/
                                                                                                                                                                                                                                                                                                                                                                    PTYPE=PINFO.PTYPE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SELECT (VOP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          OTHERWISE DO:
                                                                                                                                                                                                                                                                                                                                                                                                       SELECT (PTYPE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ë
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VINIT: PROC:

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KINCLUDE EDFP1, EDFB1; VINOGGO AND DEBUGGING FACILITIES: */ VINOGGO ***** CONTROL STRUCTURE, PANEL MANAGER AND DEBUGGING FACILITIES: */ VINOGGO
                 VIN00030
                                    VIN00040
                                                                           VIN00060
                                                                                              VIN00070
                                                                                                                     VINCOOBO
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                                                                                                                                                                                                                                                                                                                                                                                                                                              ***** AS INDICATED IN VINIT ARG:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ••••• AS INDICATED IN VINIT_RIN;
                                                                                                                                                                                                                                                                                                                                                                                        PSET FROM NINIT RIN AND IN TURN RETRIEVE ALL KEYS.
IF NEW INIT, CALL DEFP (THROUGH DFP1) AND DEFB (THROUGH DFB1) TO CREATE PSETS AND BSETS USED IN STORING CATALOGUE ENTRIES AT THIS LEVEL; THE PSETID'S AND BSETID'S RETURNED ARE SAVED IN A STATIC STRUCTURE CALLED KEY, TO BE SHARED BY RELEVANT MODULES AT THIS LEVEL.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           KEY IS INSERTED IN TO AN ANCHOR PSET BY CALLING UPDN;
PSETID OF ANCHOR PSET IS PASSED TO THE N-ARY LEVEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1 BC(5), /*DATA FOR DEF OF 5 BSETS IN CATALOGUE; SEQUENCE IS
                                                                                                                                                                                                                                                                                                                                                                      OF THE ANCHOR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RTN CODE FIXED BIN (15);
1 PG(7), /*DATA FOR DEF OF 7 PSETS IN CATALOGUE; SEQUENCE
                                                                                                                                                                               DETERMINE WHETHER IT IS A FILE INIT OR A NEW INIT;
                                                                                                PURPOSE: INITIALIZES THE ENTITY LEVEL EITHER FROM AN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EXTERNAL STATIC VARIABLES TO HOLD STATIC DATA: KEY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ESET, ENM. EINFO, ASET, ANM. AINFO, KEY+/
PTYPE CHAR (1) INIT ('X', 'C', '8', 'X', 'C', '8', '8'),
PLEN FIXED BIN INIT (0,8,4,0,8,29,4),
TYPE CHAR(1) INIT ('E', 'V', 'V', 'E', 'V', 'V'),
PSETID BIT (32);
                                                                                                                                                                                                                                                                                                                                                 IN NINIT (OP=STK) CALL.
IF FILE INIT THEN' OBTAIN THE PSETID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ENAME, EINFO, ESET, ANAME, AINFO*/
FUNC CHAR(1) INIT ('S', 'S', 'M', 'S', 'S'),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       INTER-LEVEL T-PROC: NINIT, RETN, UPDN:
                                        DESCRIPTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         INTRA-LEVEL T-PROC: NONE;
INTRA-LEVEL S-PROC: DFP1,DFB1;
                                                                                                                    EXISTING FILE OR FROM SCRATCH.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME CHAR(8), I FIXED BIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GINCLUDE ANINI, ARETN, AUPDN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALLING ARGUMENTS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          OUTPUT PARAMETERS:
                                          MODULE
                                                                                                                                                                                                                                                                                                                                                                                                                                INPUT PARAMETERS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALLS PROCEDURES:
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (P. TP. RP. MP. RTP) PTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NULL BUILTIN:
                                                                                                                                                                METHOD:
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RIP->VINIT RIN.RIN GODE *1;
IF FDEBUG.LEV1 THEN PUT SKIP LIST ('VINIT: DFP1 ABEND');
GO TO RIN;
                                                                                                                                                                                                                                                                                  ALLOCATE VINIT_RTN SET (RTP);
RTP->VINIT_RTN.RTN CODE=O; /*INITIALIZE RTN CODE TO O.K.+/
/*SET UP MSG TO CALL NINT +/
NAME=MP->VINIT_ARG.FNAME; /*GET FILE NAME+/
ALLOCATE NINIT_ARG;
NINIT_ARG.FNAME;
NINIT_ARG.OP='I': /*INITIALIZE NEXT LEVEL+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CALL SVC3 (TP); /*NINIT RTN NO LONGER NEEDED*/
DO I=1 TO 7; /*DEFINE 7 PSETS*/
CALL DFP1(PC.PTYPE(I), PC.PLEN(I), PC.TYPE(I), RTN_CODE,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BC. PSETID(1, 1) = KEY(1);
BC. PSETID(1, 2) = KEY(2);
BC. PSETID(2, 1) = KEY(1);
BC. PSETID(2, 2) = KEY(3);
BC. PSETID(3, 2) = KEY(4);
BC. PSETID(3, 2) = KEY(4);
BC. PSETID(4, 1) = KEY(4);
BC. PSETID(4, 2) = KEY(4);
BC. PSETID(5, 2) = KEY(4);
BC. PSETID(5, 2) = KEY(6);
BC. PSETID(5, 2) = KE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RIP->VINIT_RTN.RIN_CODE=1; /*SET_RIN_CODE_INVALID*/
CALL_SVC3(TP); /*FREE_RIN_MSG*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GO TO RIN; /+GO TO END+/
END; /+END OF STANDARD MSG PROCESSING+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /*PROCESS INITIALIZATION OF CURRENT LEVEL*/
IF NAME*(8)' ' THEN /*'NEW' INIT*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CALL TCALL ('NINIT', 1,P,TP);
CALL SVC3 (P); /*FREE CALLING ARG*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF TP->NINIT_RTN.RTN_CODE ^=0 THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /*NEW INIT: DEFINE CATALOGUES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*SET PSETID FOR BC STRUCTURE*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF I=7 THEN AKEY=PC.PSETID(1);
ELSE KEY(1) = PC.PSETID(1);
END /+DEFINE 7 PSETS+/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BC.RTN_CODE(1), BC.BSETID(1));
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IF RTN_CODE >=0 THEN DO:
                                                                                                                                                                                                                CALL TBEG (PROC_ADDR, MP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PC.PSETID(I));
                            2 RTN CODE FIXED BIN, 2 BSETID BIT (32);
2 PSETID (2) BIT(32).
                                                                                                                                                                                / *BEGIN PROCESSING * /
                                                                                                           DCL AKEY BIT(32);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ËS:
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FILE: VINIT

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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL EBOT;/*EBOT IS A SUBROUTINE WHICH BOOTSTRAP CAT ENTRIES*/
                                                                                                                                                                                                                                                                                                                                                                                                                                  /*CALL UP THE NEXT LEVEL TO STORE KEY TO THE ANCHOR SET*/
                                                                                                                                                                                                                                                                                     CALL SVC3(P); /*FREE CALLING ARG LIST*/
IF TP-> UPDN RIN.RIN_CODE ^=0 THEN DO;
RTP->VINIT_RIN.RIN_CODE=1; CALL SVC3(TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CALL SVC3(P); /+FREE CALLING ARG LIST+/
IF TP->NINIT_RTN.RTN_CODE ^=0 THEN DO;
RTP->VINIT_RTN.RTN_CODE=1; CALL SVC3 (TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                              ALLOCATE NINIT ARG;
NINIT ARG.KEY*ÄKEY;
NINIT ARG.OP*'S'; /*ASKS NINIT TO STORE KEY*/
CALL TCALL ('NINIT',1,P,TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /*** BOOTSTRAP CATALUGES HERE ******/
                                                                                                             /*STORE 11 KEYS INTO THE ANCHOR PSET*/
                                                                                                                                                                                                                                                                                                                                                                                               CALL SVC3(TP); /*FREE RTN MSG CHAIN*/
IF BC.RIN_CODE (1) ^=0 THEN DO;
RIP->VINIT_RIN.RIN_CODE=1;
GO TO RIN;END;
KEY([+6]=BC.BSETID(]);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL SVC3(TP); /*FREE RTN MSG LIST*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CALL TCALL ('RETN', 1,P.TP);
CALL SVC3(P); /*FREE CALLING ARG*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /+OBTAIN THE REST OF THE 11 KEYS+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ALLOCATE RETN ARG;
RETN ARG. PSETID-AKEY;
RETN ARG. GET-RETNGET. ALL;
                                                                                                                                                                                                                                   CALL TCALL ('UPDN', 1,P,TP);
                                                                        END /*DEFINE 5 BSETS*/;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     END /*NEW INIT PROCESSING*/;
                                                                                                                                                          UPDN ARG. PSETID-AKEY;
UPDN ARG. OP-UPDNOP.CRT;
UPDN ARG. DLEN=4;
UPDN ARG. DATA=KEY(I);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AKEY=TP->NINIT_RTN.KEY;
                                                                                                                                             ALLOCATE UPDN_ARG;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ELSE DO; /*FILE INIT*/
/*OBTAIN ANCHOR KEY*/
                                                                                                                                                                                                                                                                                                                                            GO TO RTN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALL SVC3(TP);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GO TO RTN;
                                                                                                                             Do I=1 TO 11;
                                                                                                                                                                                                                                                     END/*1*/;
```

```
VINO 1680
VINO 1700
VINO 1710
VINO 1710
VINO 1720
VINO 1750
VINO 1760
VINO 1760
VINO 1760
VINO 1800
VINO 1820
VINO 1820
VINO 1820
VINO 1830
VINO 1830
VINO 1830
VINO 1830
VINO 1830
VINO 1830
    VIN01660
VIN01670
IF TP->RETN RTN.RTN_CODE ^=0 THEN DD;

IF FDEBUG.LEV1 THEN PUT SKIP LIST ('INSIDE FILE INIT, JUST RETURNED FROM RETN, AND RTN_CODE IS NOT 0.K.');

RTP->VINIT_RTN.RTN_CODE =1; CALL SVC3(TP);
GO TO RTN;
                                                                                                                                                                                                                         CALL SVC3(TP); /+FREE RTN MSG LIST+/
                                                                                                                                                                                                                                                                                        RTN: CALL TRTN (PROC_ADDR,RTP);
END /*VINIT*/;
                                                                                                                   /*GET KEVS*/
P=TP->RETN_RTN_PTR;
DO I=1 TO 11;
KEY(12-I)*RETN_RTN1.DATA;
P=RETN_RTN1.PTR;
                                                                                                                                                                                                                                                          END /*FILE INIT+/;
```

VNME: PROC

```
VNMO0270
VNMO0280
VNM00020
                       VNM00030
                                          VNH00040
                                                              VNM00050
                                                                                                     VNM00070
                                                                                                                                                                                                                                                                                                                                                                                                                 VNM00220
                                                                                 VNM00060
                                                                                                                        VNIMOOOBO
                                                                                                                                              06000MNV
                                                                                                                                                                   VNM00100
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                   /* T-PROC AT THE ENTITY LEVEL, INVOKED BY DMB (BASE DATA MANIPULATION) SUBSYSTEM AT THE USER INTERFACE LEVEL, TO CHECK FOR LEGALITY OF NAMES STATED BY USER BEFORE ACCEPTING DATA */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IF T.PARENT(!)=0 THEN ENAME=T.ENAME;

ELSE ENAME = PARENT ENAME (T.PARENT (!));

CALL GACT (T.ANAME (!), ENAME, AINFO, RTN_CODE);

IF RTN_CODE ^= 0 THEN DO;

RTP->VNME_RTN.N=1; /+0+ IS PROBLEM WITH ATTRIBUTE NAME *****/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF AINFO.TYPE='E' THEN PARENT_ENAME (I)=AINFO.ENAME; /*REMEMBER
TARGET ESET NAME */
END /* DO I */;
                                                                                                                                                                                                                                                                                                             CALL GECT (T.ENAME,EINFO, RTN_CODE);
IF RIN_CODE ^=0 THEN DO;
RTP->VNME_RTN.N=-1; /*** PROBLEM WITH ENTITY SET NAME *****/
                                                                                                 XINCLUDE SERVICE, AVNME, EGECT, EGACT, DECAT;
DCL ENAME CHAR (8);
DCL (P.RTP) PTR, RTN CODE FIXED BIN, NULL BUILTIN;
DCL PARENI_ENAME(25) CHAR (8); /* TEMP STRUCTURE */
DCL I FIXED BIN (31);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RTP->VNME_RTN.N=O; /* NO PROBLEM */
RTN: CALL TRIN (PROC_ADDR, RTP);
                                                                                                                                                                                                                                                     CALL TBEG (PROC_ADDR.P);
ALLOCATE VAME_RIN SET (RTP);
                                                                                                                                                                                                                                                                                                                                                                                                                                          /+VALIDATE ATTRIBUTES +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                             DO I . 1 TO T.TN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GO TO RTN:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           END /* VNME +/;
                                                                                                                                                                                                                                                                                                                                                                          GO TO RIN:
                                                                                                                                                                                                                                 /* BEGIN */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RETURN;
```

```
/* RIN_CODE NOT SIGNIFICANT */ DUMOO170
/* NAME ERROR */ DUMOO190
LEGAL ENTITY SET NAME'); DUMOO210
IBUTE NAME ',T.T1.ANAME(N))(A,A); DUMOO250
DUMOO250
DUMOO250
DUMOO250
DUMODO 10
DUMODO 20
DUMODO 30
DUMODO 60
DUMODO 60
DUMODO 60
DUMODO 70
DUMODO 120
DUMOD 130
                                                                                                                                                                                                                                                                                                                                                                                      IF N = -1 THEN PUT SKIP LIST ('ILLEGAL ENTITY SET NAME');
ELSE PUT SKIP EDIT ('ILLEGAL ATTRIBUTE NAME ',T.T1.ANAME(N))(A,A);
                                                                         ;
VNM+: PROC (T, RTN CODE, N);
/**SUBROUTINE TO SET UP CALL TO VNME**/
XINCLUDE AVNME, SERVICE, FDEBUG;
DCL (RTN CODE,N) FIXED BIN;
DCL 1 T, /*DATA STRUCTURE OF NAMES TO BE VERIFIED
2 ENAME CHAR(8),
2 TN FIXED BIN, /*NUMBER OF ATTR*/
                                                                                                                                                                                                                                                                                                            RIN. CODE : TP->VNME_RIN.RIN_CODE;
N=TP->VNME_RIN.N;
IF N ^= 0
THEN DO;
                                                                                                                           2 T1 (25),
3 PARENT FIXED BIN,
3 ANAME CHAR (8);
DCL (TP,P)PTR, NULL BUILTIN;
                                                                                                                                                                                                                                                                               CALL TCALL('VNME', 1,P,TP);
CALL SVC3(P);
                                                                                                                                                                                                                     ALLOCATE VNME_ARG;
VNME_ARG.T=T;
```

RETURN; END;

```
VIP00020
                                                  VTP00040
                                                                  VTP00050
                                                                                  VTP00060
                                                                                                     VTP00070
                                                                                                                                     VIP00090
                                                                                                                                                     VIP00100
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                                                                                                                                                  TO CHAR FIXED BIN INIT (2), TO BIT FIXED BIN INIT (1);
TO BIT CHK FIXED BIN INIT (3);
CDATA CHAR (40), BDATA BIT (320), (DLEN, RTN CODE) FIXED BIN;
NUM FIXED BIN (31); /*TO HOLD CONVERTED FIXED BIN NUMERIC DATA*/
VERIFY BUILTIN; DCL BIN BUILTIN;
DATA CHAR (40) VARYING;
                               /.A S-PROC AT THE ENTITY LEVEL TO CHECK FOR DATA TYPE VALIDITY AND PERFORMS CONVERSION FROM CHAR TO BIT OR VICE VERSA DEPENDING ON
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SUBSTR(BDATA,1,32)-UNSPEC (NUM); /+TO BIT STRING+/
DLEN+4; /+4 BYTES LONG+/
END /+WHEN 'N'+/;
VIPE: PROC (AINFO, MODE, BDATA, CDATA, DLEN, RTN_CODE);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         BDATA * UNSPEC (SUBSTR (CDATA, 1, AINFO.MLEN));
                                                                                                                                                                                                                                                                                                                                                                                                           IF AINFO.TYPE ** V' THEN DO; / + FOR V TYPE NOOE ONLY +/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RTN CODE-1; /+ILLEGAL NUM DATA+/
RETÜRN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF DATA =(40)'' THEN NUM=0;
ELSE NUM=DATA; /* CONVERSION */
                                                                                                                                                                                                                                                       (UNSPEC, SUBSTR) BUILTIN, I FIXED BIN;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             I=VERIFY(DATA, '0123456789 ');
                                                                                                   DECAT: / FOR AINFO TEMPLATE ./
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             WHEN ('N') DO; /*NUMERIC DATA*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DATA-SUBSTR(CDATA, 1, DLEN);
                                                                                                                                                                                                                                                                                                                                                          WHEN (TO BIT, TO BIT CHK) DO:
/*FROM CHAR STRING TO BIT STRING*/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   /+CHECK FOR LIMITS++/
                                                                                                                                                                                                                                                                                                     RTN CODE-0;/+INIT TO 0.K.+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF 1 .= 0 THEN DO;
                                                                                                                                                                                                                                                                                                                                                                                                                                              SELECT (AINFO.VTYPE);
                                                                                                                                                                                                                                                                                          /*BEGIN PROCESSING***/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EZO:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                     MODE FIXED BIN;
                                                                     THE MODE GIVING+/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ËŠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ..
2
                                                                                                                     FDEBUG:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         OTHERWISE
                                                                                                                                                                                                                                                                                                                          SELECT (MODE);
                                                                                                                XINCLUDE
                                                                                                     XINCLUDE
                                                                                                                                                                                      222
                                                                                                                                                                                                                                      200
```

VTP00550

DLEN - AINFO.MLEN: END:

PLIOPT A1

FILE: VTPE

```
VTP00560
VTP00510
VTP00590
VTP00610
VTP00620
VTP00630
VTP00650
VTP00650
VTP00650
VTP00650
VTP00700
VTP00700
VTP00710
VTP00710
VTP00710
VTP00710
VTP00710
VTP00710
VTP00710
VTP00710
VTP00710
                                                                                                        WHEN ('N') DO;
UNSPEC (NUM)-SUBSTR(BDATA,1,32); /*GET DATA*/
PUT STRING(CDATA) EDIT(NUM)(F(AINFO.MLEN));
DLEN-AINFO.MLEN;
END;
                                                                                                                                                                                             OTHERWISE UNSPEC(CDATA) = BDATA;
                                                                           IF AINFD. TYPE "-V" THEN DO;
SELECT (AINFO. VTYPE);
END /+SELECT VTYPE+/;
END /+TYPE+/;
END /+TO_BIT MODE+/;
                                                                                                                                                                                                                    END /*SELECT VTYPE*/;
END /*TYPE*/;
END /*MODE TO_CHAR*/;
                                                    WHEN (TO_CHAR) DO;
```

END /\*VTPE\*/;

END /+SLECT MODE+/;

